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VALUATION AND RATE REGULATION.

After subsiding somewhat for a while, the agitation for subject of valuation of railways has been revived by a resolution adopted by the National Association of Railway Commissioners at its last meeting favoring a valuation by the federal government and by the recommendation by the Interstate Commerce Commission in its annual report of a "physical" valuation. These things give timely interest to an article by J. C. Lawrence, a member of the Washington Railway Commission, which we publish in another column, describing the method used by this commission in making its recent valuation.

The Washington valuation differs from all others in an important particular. It is the first valuation ever made for the purpose of regulation of rates which is based on the market, or actual, value of the railways. The Interstate Commerce Commission in 1904 made a "commercial" valuation; but it was not made as a basis for fixing rates. The Minnesota commission has made a valuation expressly to be used as a basis for regulation of rates; but it is merely a "physical" valuation. Even if those are right who contend that rates should be based on the value of the property, it seems highly probable that if any commission or legislature should seek, by means of a valuation based on the cost of physical reproduction alone, like that of Minnesota, to defend low rates it had fixed, the Supreme Court of the United States would hold its valuation worthless and disregard it. For the court, in the oft-quoted case of Smyth *vs.* Ames, mentioned several other factors that should be considered. One is the "probable earning capacity of the property under particular rates prescribed by statute." But the probable earnings cannot be estimated without considering the nature and density of the present and probable future traffic. Another is the "sum required to meet operating expenses." Still another is the "amount and market value of the bonds and stock." As has been said in the past by the *Railway Age Gazette*, it is hard to understand how, since the court specifically said that these things must be considered, the idea can have grown up that it will hold valid any valuation, such as that in Minnesota, in which they are ignored.

The Washington commission acted in accordance with the views expressed in Smyth *vs.* Ames. In addition to ascertaining the cost of reproducing the physical properties it took a large amount of evidence and made specific findings regarding the conditions and costs of operation, the densities and natures of the traffic, the market values of the stocks and bonds of the various railways, etc., and to the estimated present value of the physical properties of the roads the commission made additions on account of their present and future characters as going concerns, and found the respective market values per mile of the principal roads in Washington to be as follows: Northern Pacific, $106,500; Great Northern, $73,900; Oregon Railroad & Navigation Company, $38,900. Of course, the additions to be made to ascertain the market values necessarily were arrived at by more or less arbitrary exercise of the commission's judgment. The average capitalization per mile of the entire Northern Pacific Railway is $59,000; of the Great Northern, $45,000, and of the Oregon Railroad & Navigation Company, $41,000. Construction in Washington is relatively costly. But as the Minnesota commission also found that the average cost per mile of reproducing the physical properties of the Northern Pacific and Great Northern in Minnesota, where construction is comparatively cheap, would exceed the average capitalization per mile of these roads in their entirety, the conclusion is inevitable that a fair valuation of these roads in their entirety would demonstrate that their aggregate values far exceed their total capitalizations.

The members of the Washington commission agreed on all other details of their valuations, but disagreed entirely on how they should be divided for state and interstate business. Assuming that both interstate and state rates are reasonable it is obvious that the proper way to divide a valuation is on the basis of net earnings. But the fundamental assumption of those who make valuations is that they may show that the state or the interstate rates, or both, are unreasonable, and that, therefore, the net earnings are unreasonable. If the net earnings cannot be used, what basis can be? The division cannot be made at all on the cost of physical reproduction, because the same roadway and equipment are used for the transportation of both state and interstate business. It cannot be based on gross earnings. They are derived from the application of the rates whose reasonableness is under determination; and gross earnings are no index of value, any way, except when considered in connection with the expenditures necessary to produce them.

The method of division favored and adopted by a majority of the commission, Messrs. Lawrence and Jones, is given in some detail by Mr. Lawrence in his article elsewhere. Chairman H. A. Fairchild vigorously dissented. He contended that the valuation should be divided according to earnings. He pointed out, among other things, that the consequence to the Great Northern of the division according to the theory of the majority was the conclusion that, assuming the road was entitled to earn 6½ per cent. on its valuation, its interstate rates were too low, while its state rates were excessive. He said that it probably could not raise its interstate rates to recoup itself for the loss that would be caused by the reduction of its state rates, and in consequence it would be disabled from earning any return on over $10,000,000 of its valuation. On the basis of division he favored none of its rates would be reduced, and it could continue to earn 6½ per cent. on its entire valuation.

A railway is an integral whole; and if valuations are to be made and used for the regulation of rates the only fair and rational method is to have them made by the federal government and then either have rates regulated exclusively by the federal government, or divide the valuation for state and interstate purposes on some basis agreed on by the interstate and state commissions, which will enable each road to earn a return on its entire valuation.

It has been supposed in the past that rate-making is an exercise of judgment. It seems to be assumed by many that after a valuation has been made it will be merely an exercise in mathematics. Suppose the value of a railway for state purposes is $50,000,000. Then, on this theory, all that will have to be done will be to multiply this amount by 6 per cent. —or whatever may be regarded as a fair return—and so adjust the rates as to enable the road to earn, say, $3,000,000 a year. But how are the specific rates to be fixed? A great majority of those who advocate valuation say that they should be based on the cost of the service. The proper method, then, would be to ascertain the exact cost of hauling each commodity and then base rates on these ascertained costs, making them just high enough to allow the road a fair return. At present the rates for long hauls and cheap bulky commodities are usually less in proportion to the cost of the service than the rates for short hauls and more valuable commodities. On the cost theory the rates for long hauls and low grade commodities would have to be advanced, and those for short hauls and the more valuable commodities reduced. But the railways make relatively lower rates for long hauls and cheap and bulky commodities mainly because the traffic managers have found that the long haul and the cheap, bulky traffic cannot bear higher rates. If these kinds of traffic cannot bear higher rates, obviously an advance in the rates on them would curtail the traffic afforded by them. Many producers and shippers would, in consequence, be injured. It might easily happen that owing to this reduction of traffic the railways would fail to earn a fair return on their valuation. Then it would be necessary to make a general advance in rates. Then more traffic might be destroyed, and it might be necessary to make further advances.

The theory of basing rates absolutely on the cost of the service is unjust and impracticable. This was the conclusion of the Washington commission. It is the view of every traffic manager and every intelligent rate regulating body, including even the Texas commission. This commission said in its first report: "This (the mileage principle) is the only equitable and just principle on which freight rates can be based." After three years of effort to apply the mileage basis, the Texas commission said:

"This we believe to be the proper basis for rate making where it can be applied, but there are so many circumstances affecting traffic, necessitating modifications or changes in mileage rates, that the theory is in many cases destroyed in practice. So varying are the conditions surrounding the roads in the different parts of the state and so diverse are the circumstances affecting traffic that no iron-bound rule of action can be prescribed in the making of freight tariffs."

It is said by some that while rates cannot, taking the valuation as a basis, be fixed absolutely on the cost of the service, the valuation can at least be used as a measure of the return to which the railway is entitled. But there is only one other principle on which rates can be fixed. This is the value of the service. If they cannot be fixed by mathematical calculation they must be fixed by the exercise of judgment, according to what the traffic will bear. If they are to be made by the exercise of judgment, whose judgment is more apt to be correct—that of the traffic manager of the railway who, with his numerous subordinates, is engaged in the constant study of the conditions and needs of the territory in which his road operates, or that of railway commissions whose members lack opportunity to keep so closely in touch with conditions, and who, as they usually enter office with little or no knowledge of the railway business, and as they are constantly changed, usually never acquire expert knowledge?

It is replied that the fixing of rates by the traffic manager of the railway on the basis of the value of the service is objectionable because it involves an inquiry by the railway into the profits of the shipper. But the shippers who constantly are coming to the traffic manager and asking him to reduce their rates on the ground that on the present rates they cannot make a profit, invite such inquiry. If the traffic manager in fixing rates ought to take into consideration the disadvantages under which shippers on his line labor and the smallness of their profits, is he not entitled, when they get to doing better, to take into consideration their advantages and the larger profits which they have come to enjoy? The critics of the value of the service theory attack it as if it were a theory of extortion; in fact, it is a theory of moderation; it fixes rates in proportion to the needs of the shippers.

Some concede that the various specific rates must be based mainly on the value of the service, who yet contend that valuation is a fair measure of the reasonableness of a railway's earnings. But neither the common law nor the statutes of the United States or of any state authorizes the regulation of a railway's earnings. They authorize only regulation of rates. Disregarding, however, the legal phases of the subject, what probably would be the economic effects of attempting to limit railway net earnings to a "fair return on a fair valuation?" Net earnings may be increased either by advancing rates on commodities whose movement will not thereby be curtailed, or by reducing rates on commodities whose movement will thereby be greatly increased; and net earnings may be reduced either by reducing rates already so low that no further reduction will increase the movement of traffic, or by advancing rates on commodities which cannot bear an advance. If, therefore, the object is merely to curtail railway earnings, it may be as easily attained by advancing some rates as by reducing others.

Of course, the main aim is to reduce rates as low as practicable. But it is easy to see how, in many cases, limitation of railway earnings might actually have the effect of preventing reductions in rates. Suppose a railway is earning on its state valuation the exact return to which the commission considers it entitled. It has an empty car movement in one direction. A shipper brings to its traffic manager's attention the fact that if it will make him a low rate that will enable him to reach a certain market he can give it traffic which will load its empty cars and yield revenue somewhat exceeding the additional expense incurred in handling the additional traffic. The railway makes him the rate requested and thereby so increases its net earnings as to make them exceed what the commission considers a "fair return." It is assumed that the commission will do its duty as it sees it and compel the road to make enough further reductions in its rates to lop off its excess earnings. The railway will then have gained nothing; it will handle a larger traffic for the same return. When another shipper comes for a reduction in rates, will the traffic manager be so willing to make it? Why should a road which is earning all it is allowed to reduce its rates in a vain effort to earn more?

The effect of carrying out this plan in the way that is being very widely advocated would be to prevent investments in improvements in prosperous roads, to bankrupt the unprosperous and to stop the construction of new lines. The more prosperous roads are earning more than the percentage to which those who advocate a valuation think that railways should be limited. Why should they invest money to reduce operating expenses when warned that all of their net returns above a certain low percentage will be appropriated by reductions in rates? In every part of the country there would be found some road or a class of roads that was earning larger net returns than competing lines. If the rates of these roads were so reduced as to prevent them from earning more than a "fair return" the less prosperous competing roads would be prevented from earning a "fair return" or perhaps any at all.

The length to which those who advocate the "near-confisca-

tion" theory of regulation are prepared to go is illustrated by the attitude of the complainants in the cases involving freight rates in the West which are now pending before the Interstate Commerce Commission. The complainants in the Spokane rate case contend that all that the Northern Pacific and Great Northern are entitled to is a small percentage of return on their actual value, and that the fact that the effect of reducing their earnings to a "fair return" would be to prevent the Harriman Lines, which reach Spokane by a circuitous route, from making any money at all from their Spokane business, is no valid reason why it should not be done. The weakest line involved in the Salt Lake rate case is the Denver & Rio Grande; and in this case the complainants vigorously argue that the Union Pacific, which is the strongest line, should be restrained from earning more than what they consider a fair return, even though the certain effect be to bankrupt the Denver and Rio Grande. The weakest road involved in the Portland rate case is the new road of the Hill lines, the Spokane, Portland & Seattle, which recently has been built at very heavy cost and which has not yet had time to build up a substantial traffic. With reference to this road counsel for the complainants in the Portland case said:

"From any standpoint the returns on this particular road should have no consideration as affecting the reasonableness of the rates involved in these cases. Considered as a separate road, if extravagantly or imprudently constructed, poorly located, or if there are more roads than business at fair rates, then it must rely upon the future earnings for its returns The public cannot be charged for such mistakes. * * * In any event, it cannot be used as a lever for maintaining unreasonable rates."

There was great rejoicing at Portland and other western points on the advent of the Spokane, Portland & Seattle. But, while the people of that section welcomed the increased transportation facilities supplied by the newcomer, the statements of counsel indicate that in order to limit the earnings of the older roads they are perfectly willing to entirely destroy the earning capacity of the new one. A new road is necessarily built at a greater expense than was an old one. It necessarily, for many years, will have less traffic. If, in addition, it is to be limited to rates which will barely return the current rate of interest on the older roads, the demand for new railways in the less developed parts of the country is apt speedily to outstrip the supply.

If, on the other hand, the policy should be adopted of so regulating rates as to enable the weakest roads to earn a "fair return," not only would no reductions be made for years to come in most parts of the country, but many advances would be requisite. Meantime, of course, the more prosperous roads would earn much in excess of a "fair return" if, as is contended, this be the current rate of interest on good securities.

It is impossible to see how a valuation of railways, even though made with the intelligence and fairness that characterize the Washington commission, could be of any considerable aid either to railway managers or to regulating authorities in making rates. The Interstate Commerce Commission seems to concede this in its recent annual report. At the same time it indicates the way in which it thinks a valuation would be useful. It says:

"Even assuming that the valuation of our railways would be of no assistance of this commission in establishing reasonable rates, it is necessary, if those rates are to be successfully defended when attacked by the carriers, that some means be furnished by which, within reasonable limits, a value can be established which shall be binding upon both the courts and this commission."

But why is it necessary, in order that "reasonable" rates fixed by the commission may be successfully defended, that a valuation shall be made, or that the value of the railway shall be taken into consideration at all? It would seem that the necessity for taking into consideration the value of the property can never arise in court except when the contention is made that a public authority is seeking to confiscate the property. Then the question is not whether rates are reasonable, but whether they are confiscatory; which is a very different matter, unless, as is assumed by a great many persons, any rate is excessive which more than barely escapes the constitutional prohibition against confiscation. If the true test of the reasonableness of rates is the value of the service, not the value of the property by which it is rendered, no valuation is necessary to defend in the courts rates made by the Interstate or any other commission. It can be needed only on the theory that it is to be the policy to so regulate rates as constantly to raise the question, not of reasonableness, but of confiscatoriness.

It seems beyond serious question that a fair valuation would demonstrate that the present value of the railways exceeds their aggregate capitalization; the removal of the gross misapprehension on this subject from the public mind is very desirable. Past experience has shown that legislatures and railway commissions, with a few exceptions, are strongly prone to fix rates which are not only unreasonably low, but are absolutely confiscatory; a fair valuation would be a restraint on attempts at this sort of regulation and a preventive of their success. It is believed it would tend to show that railways are entitled to advance their rates rather than that they ought to reduce them. Whether these results would justify the large public expenditure necessary to make a valuation, which probably would be out of date before it was finished, and which might very possibly be unfairly made and unfairly used, seems rather doubtful.

Letters to the Editor.

ADVANCED SIGNALING PRACTICE IN THE EAST AND IN THE WEST.

New York, Feb. 21, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Your correspondent, V. C., whose letter dated Chicago, Feb. 7, 1910, is shown among other letters to the Editor, on page 341 of the *Railway Age Gazette* of Feb. 18, called attention to the fact that in testifying before the New York State Public Service Commission recently I did not mention the names of any western roads, when referring to the use of the upper quadrant for displaying signal indications.

I wish to acknowledge the courtesy of V. C.'s charitable assumption that I was simply thoughtless in naming only the New York Central, New York, New Haven & Hartford, Pennsylvania and the Baltimore & Ohio, as roads that were using the upper quadrant. As a matter of fact it was not thoughtlessness that led to the omission of the names of the other roads, but a desire (1st) to cite the roads near New York and familiar to the members of the commission, and (2d) to make the list as brief as possible, having at that time been on the stand somewhat more than an hour. As schoolboys I think we all learned to say the names of the states, beginning with Maine and working down the coast, and thence west, and in naming a list of railways it comes natural, at least to a New Englander, to start up in that corner of the map.

I am very glad that V. C. has called attention to the fact that progress and modern methods in signaling are not confined to the country east of the Alleghenies. The west needs no champion, (first) because its accomplishments speak for themselves, and (second) because the country is big enough and its railway men should all be broad enough so that the question of points of the compass ought not to arise in the discussion of matters so important to our railways as is the question of signaling. There is too much work to be done in safeguarding traffic and in other lines of railroading to afford to have an ounce of energy wasted on sectional disputes. The Railway Signal Association should, I believe, frown most severely upon anything that savors of sectionalism

in its discussion. It has no more to do with the pressing technical question before it for solution than has the color of the hair of the gentleman who may be discussing the matter.

To-day is a good time to recall some of the words of Washington, and a paragraph of his reply to the suggestion made by Colonel Nicola in 1782, that the General should make himself a king, can, I think, be well addressed to anyone who permits other considerations than those of safety, reliability and economy to enter into his consideration of questions before the association. The last paragraph of General Washington's letter reads as follows:

"Let me conjure you, then, if you have any regard for your country, concern for yourself or posterity, or respect for me, to banish these thoughts from your mind and never communicate as from yourself or anyone else a sentiment of the like nature." AZEL AMES.

ACCIDENT RECORD CORRECTION.

Chicago, Feb. 25, 1910.

To the Editor of The Railway Age Gazette:

I notice on page 352, February 18, in your list of train accidents in January, the C., B. & Q. is charged with a collision at Judith Gap, Montana. This is incorrect, as our line ends at Billings, about 114 miles southeast of Judith Gap. . .

H. E. BYRAM,
Vice-President, Chicago, Burlington & Quincy.

[Judith Gap is on the Great Northern. The Associated Press used the term "Burlington road" when it meant, doubtless, "Burlington train," the Seattle train that runs through over the Burlington & G. N. Our conductor and engineer both "forgot to look at the register."—Editor.]

Contributed Papers.

EQUIPMENT DEPRECIATION AND RENEWAL.

BY WILLIAM MAHL,
Vice-President, Union Pacific and Southern Pacific Systems.

In an article by the writer dealing with equipment depreciation (*Railroad Gazette*, Oct. 11, 1907), attention was called to the difficulties which would be encountered in dealing with equipment renewals and depreciation as proposed by the Interstate Commerce Commission and the hope was expressed that the commission would amend, for the present at least, the classification of operating expenses about to be promulgated by omitting therein the provision for "Depreciation" and amending the provision for "Renewal" to the effect that the latter would represent the current cost of replacing all equipment vacated. In the meantime the commission could collect data from which it could be determined how far the use of any fixed per cent. of depreciation would be of practical application or possess any practical value. Understanding then that the main object of these provisions by the commission was to control undercharges to operating expenses by charging equipment vacated to capital expenditures and, conversely, to overcharges to operating expenses by additions to equipment which should have been charged to capital expenditures, I suggested to the commission the simple remedy of a suitable primary account in their classification of operating expenses to which should be charged the amounts which the railways had included in the operating expenses for equipment vacated. The proportion that the amounts thus charged for locomotives and for cars vacated would bear respectively to the total number of locomotives and of cars owned would furnish a unit for comparing these charges to operating expenses of one railway with those of another, as, in a general way we compare the cost per mile of road or track for maintenance of way and structures and thus determine from our knowledge of these matters whether or not the charges are above or below a fair and reasonable cost for maintenance and renewals. Statements Nos. 2, 3, 4 and 5, again submitted, afford a fair illustration of the practicability of these suggestions. The statements submitted in October, 1907, have been supplemented with the results for two additional years, and there is now submitted a statement (No. 1) showing annually for three years the amount and the per cent. which the cost of the equipment vacated bears to the total cost of the equipment in service, the amount and the per cent. thereof charged to operating expenses, and the amount and the per cent. of the salvage value.

The cost of the equipment of the Southern Pacific Company and transactions in respect thereof have been selected for the purpose of illustration. The constituent companies have complete records of the cost of their equipment, and, since 1885, they have dealt with the replacement of their equipment as they have dealt with the replacement of anything else which was destroyed, worn out, or otherwise disposed of, by charging to operating expenses the current cost of replacing in kind such equipment.

These records are complete for twenty-five years, and it may be reasonably assumed that the depreciation in recent years is about the normal average for these companies. The results shown on statement No. 1 are therefore of interest in illustrating the complications and confusion in accounting which would result from the adoption of any fixed per cent. other than for a mere temporary expedient to distribute an estimated amount equally over the twelve months of the fiscal year, this amount to be adjusted at the close of the fiscal year to the actual facts. The per cents. in this statement are the average of equipment owned by fifteen separate companies, and the per cent. of each company for any class of equipment differs materially from that of the other. The wide range of these average per cents. demonstrates the fact that, in these replacements, the railways are governed by conditions other than depreciation and that, irrespective of any arbitrary per cent. which may be fixed or adopted, the retirement of equipment will be governed solely by that which it is believed will be best for the service at the time.

Pending the collection of satisfactory data on which to base a fairly accurate per cent. of depreciation on the cost of the equipment, the Southern Pacific Company, in its desire to comply with the requirements of the Interstate Commerce Commission's classification, has, since July 1, 1907, charged to the primary account of "Renewals" the original cost (estimated if not known) of all equipment vacated, less salvage value. Prior to that date, for a period of twenty-two years the companies had charged to their operating expenses the cost of replacing. Since 1898 the cost of replacing has been at least one-third greater than the original cost, an important difference.

From statement No. 1 it will be seen that the per cent. which the actual replacements on "Depreciation" bears to the original cost of the equipment differs materially from that of the preceding years, and it must be evident from these results that the use of any arbitrary per cent. will be misleading as to facts unless a readjustment be made annually to conform to the facts. The increasing number of cars of metal construction will materially change all our estimates of depreciation. In discussing with railway officers in charge of their motive power, the writer was surprised to learn that, on the railways on which freight cars of metal construction had been in use for over a decade, the replacements compared to the number of cars in service had been so small as to be an unimportant factor in an estimate of depreciation as distinguished from repairs and renewals. It is not at all unlikely that the depreciation in metal cars will not be much above that for locomotives (in which obsolescence has been about the only item), as locomotives are repaired and rebuilt

so long as they can be profitably employed in the service to which they are adapted or assigned. As an illustration of this the reader is referred to the annual report of the Colorado & Southern Railroad Company for the year 1907 in which locomotive No. 145 is reported as placed on the road in 1868. Until recently there were some locomotives in service on the Illinois Central Railroad that were placed on the road in 1857, and there are no doubt instances of this kind on other railways.

In concluding, the writer again expresses the hope that the Interstate Commerce Commission will amend its classification of operating expenses by substituting the primary account of "Replacements" for "Renewals" and for "Depreciation," and by permitting the railways to charge to "Replacement" the current cost for reproducing in kind the equipment vacated or in capacity in the instances in which the companies desire to do so. The sum thus charged to "Replacement" will show the expenditures by the railways in maintaining the standard of their equipment suitable to their traffic and as may be permitted by their means. The commission in its classification for additions and betterments provides that, as equipment is condemned, destroyed, sold or otherwise disposed of, the capital account should be reduced by the cost of equipment vacated and, conversely, that all equipment acquired should be charged to the capital account. This is a simple and business-like disposition of the matter and the integrity of the capital account in respect of equipment is thus fully maintained. It now remains only for the commission to make a similar disposition of the equipment vacated, i. e., to charge the difference between the cost to replace, less salvage, in the operating expenses to a suitable primary account.

A railway differs from an industrial enterprise in this that to give satisfactory service to the public it must maintain the physical condition of its property in a high degree of efficiency, as any neglect therein is quickly reflected in its payments for casualties. Therefore the expenditures must be of necessity sufficient to fully make good the annual depreciation.

No. 2.—*Locomotives.*

Year.	Average serviceable number.	Expenditures and charges for— Repairs.	Vacated.	Per locomotive per annum.— Repairs.	Vacated.
1909.....	1,846	$5,488,840	$385,335	$2,973	$208.74
1908.....	1,818	5,798,950	80,969	3,090	44.54
1907.....	1,691	5,717,666	271,826	3,381	160.75
1906.....	1,655	5,042,967	767,407	3,047	463.69
1905.....	1,637	5,179,486	143,377	3,164	87.59
1904.....	1,516	5,370,649	70,334	3,543	46.39
1903.....	1,419	4,412,410	197,382	3,110	139.10
1902.....	1,323	3,528,199	237,848	2,667	179.78
Av. 8 yrs.	1,613	$5,067,396	$269,310	$3,122	$166,32

No. 3.—*Passenger Train Cars.*

Year.	Average serviceable number	Expenditures and charges for— Repairs.	Vacated.	Per car per annum.— Repairs.	Vacated.
1909.....	1,759	$1,601,276	$91,289	$910	$51.90
1908.....	1,742	1,688,727	125,022	894	71.77
1907.....	1,700	1,361,829	120,889	801	71.11
1906.....	1,624	1,194,668	146,950	736	90.48
1905.....	1,566	1,221,568	102,301	780	65.53
1904.....	1,483	1,094,459	128,248	738	86.48
1903.....	1,349	1,013,262	315,930	751	234.19
1902.....	1,300	963,747	124.680	741	95.90
Av. 8 yrs.	1,565	$1,267,441	$144,413	$810	$92.28

No. 4.—*Freight Train Cars.*

Year.	Average serviceable number.	Expenditures and charges for— Repairs.	Vacated.	Per car per annum.— Repairs.	Vacated.
1909.....	44,011	$4,561,715	$838,277	$104	$19.05
1908.....	44,312	4,011,716	1,036,482	92	23.39
1907.....	43,562	3,875,956	1,058,274	89	24.24
1906.....	44,172	3,173,773	1,269,492	72	28.74
1905.....	44,887	2,893,135	562,053	64	12.52
1904.....	44,571	3,031,840	524,882	68	11.78
1903.....	41,982	2,779,309	512,697	66	12.21
1902.....	38,625	2,380,410	465,372	62	12.04
Av. 8 yrs.	43,265	$3,338,482	$783,441	$77	$18.00

The per cent. of freight-train cars vacated to the total number of freight-train cars in service at the beginning of each year for the past 19 years was as follows:

Year.	Per cent.	Year.	Per cent.	Year.	Per cent.	Year.	Per cent.
1891...	3.44	1896...	2.87	1901...	3.13	1906...	6.83
1892...	3.75	1897...	2.28	1902...	3.53	1907...	6.67
1893...	3.00	1898...	3.54	1903...	3.15	1908...	6.45
1894...	2.57	1899...	4.41	1904...	3.01	1909...	5.49
1895...	3.41	1900...	3.02	1905...	3.48		

Including the large number of cars vacated in the year 1906, the average for the 19 years is 3.89 per cent.

The following statement shows the number of locomotives and cars vacated in each of the eight years, the amount credited to the replacement fund the amount charged to operating expenses, and the amount of salvage.

No. 1.—PER CENT. OF COST OF EQUIPMENT VACATED TO TOTAL ORIGINAL COST.

	Original cost.	Equipment condemned, destroyed, sold or otherwise placed out of service during the year— Credited to replacement account (original cost).	Per cent. on cost.	Charged to operating expenses.	Per cent. on cost.	Salvage and am'ts received from other companies.	Per cent. on cost.
Locomotives:							
Year ended June 30, 1909	$23,384,711	$478,459	2.05	$385,335	1.65	$93,124	0.398
" " " 30, 1908	24,260,769	252,025	1.04	80,969	.33	171,056	.71
" " " 30, 1907	21,815,471	357,474	1.64	201,850	.93	155,624	.71
Total	$69,460,951	$1,087,958		$668,154		$419,804	
Average for three years	23,153,650	362,653	1.57	222,718	0.96	139,935	0.61
Av. per cent. of salvage to original cost of equipment vacated							38.59
Passenger Train Cars:							
Year ended June 30, 1909	$10,359,072	$204,765	1.98	$91,289	0.88	$113,477	1.10
" " " 30, 1908	10.274,615	264,653	2.58	125,022	1.22	139,632	1.36
" " " 30, 1907	10,046,121	210,944	2.10	139,928	1.39	71,016	.71
Total	$30,679,808	$680,363		$356,238		$324,125	
Average for three years	10,226,603	226,787	2.22	118,746	1.16	108,042	1.06
Av. per cent. of salvage to original cost of equipment vacated							47.64
Freight Train Cars:							
Year ended June 30, 1909	$33,032,484	$1,328,441	4.03	$844,467	2.56	$483,974	1.47
" " " 30, 1908	32,705,781	1,637,358	5.01	1,025,122	3.14	612,237	1.87
" " " 30, 1907	33,164,958	1,768,416	5.33	1,136,919	3.43	631,497	1.90
Total	$98,903,222	$4,734,215		$3,006,508		$1,727,708	
Average for three years	32,967,741	1,578,072	4.79	1,002,169	3.04	575,903	1.75
Av. per cent. of salvage to original cost of equipment vacated							36.49
Work Equipment:							
Year ended June 30, 1909	$3,587,470	$91,490	2.55	$52,473	1.46	$38,947	1.09
" " " 30, 1908	3,131,657	68,434	2.19	40,079	1.28	28,355	.91
" " " 30, 1907	2,641,313	95,142	3.60	67,116	2.54	28,026	1.06
Total	$9,360,441	$254,996		$159,667		$95,329	
Average for three years	3,120,147	84,999	2.72	53.222	1.70	31,776	1.02
Av. per cent. of salvage to original cost of equipment vacated							37.38
Total:							
Year ended June 30, 1909	$70,363,736	$2,103,085	2.99	$1,373,564	1.95	$729,522	1.04
" " " 30, 1908	70,372,822	2,222,471	3.16	1,271,191	1.81	951,280	1.35
" " " 30, 1907	67,667,863	2,431,976	3.59	1,545,813	2.28	886,163	1.31
Total	$208,404,422	$6,757,532		$4,190,567		$2,566,965	
Average for three years	69,468,141	2,252,511	3.24	1,396,856	2.01	855,655	1.23
Av. per cent. of salvage to original cost of equipment vacated							37.99

No. 5.—*Summary of Replacements.*

Year.	Locomotives.	Train cars—Passenger.	Train cars—Freight.	Road service cars.
1909	45	51	2,434	533
1908	29	78	2,810	183
1907	34	63	2,949	148
1906	127	47	3,389	103
1905	29	28	1,556	78
1904	17	32	1,367	56
1903	34	78	1,270	33
1902	53	51	1,266	50
Total number vacated	368	428	17,041	1,184
Average for 8 years	46	54	2,130	148
Per cent. to total number in service	2.85	3.45	4.92	3.83
Credited replacement fund	$3,464,164	$1,733,558	$9,484,266	$425,358
Charged to Operating expenses	2,154,478	1,155,308	6,262,359	270,268
Scrap value or price realized for equipment sold	1,309,686	578,250	3,221,907	155,090
Average price per loco. or per car credited to replacement fund	9,413	4,050	557	359
Average price per loco. or per car charged to Operating expenses	5,855	2,699	367	228
Av'ge proceeds, sale or salvage	3,559	1,351	189	131
Per cent. of salvage	37.80	33.35	33.97	36.45

Total credited to replacement fund $15,107,346
Total charged to Operating expenses 9,842,413
Total scrap value or salvage 5,264,933

ACCIDENT BULLETIN NO. 33.

(*Continued from page* 407.)

TABLE NO. 2A. (*Continued.*)—*Causes of Prominent Derailments.*

NOTE.—D stands for derailment; P for passenger train; F, freight and miscellaneous trains.

Derailments.

No.	Class.	Kind of train.	Killed.	Injured.	Damage to engines, cars, & roadway.	Reference to record.	Cause.
1	D.	P.	2	7	.....	11	Train consisted of a single electric car, which became uncontrollable on steep grade because of slipper track and unexplained failure of air-brake. One passenger killed.
2	D.	F.	1	3	$35	25	Cars of circus train not fit to run over sharp curve; speed very low.
3	D.	F.	2	2	170	20	Car of eastbound freight knocked off track by car in westbound freight, which had been derailed by the pulling out of a drawbar, following sudden application of air-brakes because of bursting of a hose. Two men riding in car (in charge of horses) killed.
4	D.	P.	0	96	300	53	Car in excursion train, full of passengers, too heavy on inside of 16-deg. curve; sill of car rested on wheels, preventing truck from curving freely. Speed, 6 miles an hour.
5	D.	P.	0	3	2,454	55	High speed on 7½ deg. curve; superelevation of outer rail 8 in.; speed, 55 to 60 miles an hour; tender was first vehicle to run off track. Tender had side bearings for rear truck, but not for front. It ran 4,700 ft. off the rails before fact was noticed. Track in good condition.
6	D.	P.	1	61	5,000	22	Washout; 3 p.m.; train moving very slowly. Track foreman held at fault for not stopping train.
7	D.	P.	1	14	5,138	19	Unexplained; derailment at switch; tender first vehicle to run off track. One passenger killed.
8	D.	P.	0	14	5,845	23	Washout; engineman and also assistant roadmaster, riding on engine, held at fault for lack of caution in running. Derailment occurred at midnight; section foreman not on duty.
9	D.	F.	0	0	10,600	30	Unexplained; speed, 25 miles an hour on 6-deg. curve. Bridge damaged.
10	D.	F.	0	0	11,000	27	Excessive speed
11	D.	F.	0	0	12,250	51	Excessive speed.
12	D.	F.	0	5	12,450	26	Runaway on steep grade; 1:40 a.m. Engineman, 9 months in service, started train before train pipe of air-brake system was fully charged.
13	D.	P.	0	13	12,500	12	Broken rail.
14	D.	F.	0	0	13,000	24	Maliciously misplaced switch; wreck partly destroyed by a fire which started in a car containing matches.
15	D.	F.	1	1	13,465	21	Runaway on steep grade. (See note in text.)
16	D.	P.	0	3	16,250	50	Bridge weakened by fire; situated on curve where view was very short.
17	D.	P.	3	48	16,375	82	Rail joint maliciously removed and rail pulled out of place.
18	D.	F.	0	0	24,050	15	Loose wheel; derailed truck knocked down a bridge.
19	D.	P.	8	57	26,730	31	Embankment undermined by flood. Track inspected and in good order at 6 p.m. Derailment occurred at 10 p.m. Engineman and fireman killed; 6 passengers killed.
Total			19	327	$187,612		
Grand total			81	827	$453,267		

Collision No. 14, killing 16 passengers and injuring 165 passengers and 2 trainmen, was between a westbound special passenger train and an eastbound regular passenger train, the special having run only about 1½ miles from its initial point. Both trains were heavily loaded. The special had no right to the road as against the regular. It had received an order from the despatcher to meet an eastbound special at a point 5 miles farther on, and it appears that the motorman, not having read the order with sufficient care, had in his mind the impression that the eastbound train specified in the order was the regular (against which, in fact, he had no rights). When the special train was ready to start, the eastbound regular train, which was already due, had not arrived, and the conductor told the motorman to move forward a short distance (within the yard limits) to the switch at which the incoming regular train would clear the main line, the conductor's intention being to wait there until the eastbound train arrived. Having given this information, and the train having started, the conductor at once went into the first car of the train and began taking up tickets; and while thus engaged, the train went on and passed the switch (at which it should have stopped) without his knowledge. The westbound train was running 20 or 25 miles an hour a moment preceding the collision, and for this speed the motorman is held blameworthy, as he might have seen the eastbound train in time to apply the brakes some 500 ft. farther east. The eastbound train had been stopped or nearly stopped before the collision. Both trains having electric motor cars in front, with no separate locomotive, the brunt of the collision was borne by cars occupied by passengers.

Collision No. 16, killing 8 passengers and 1 employee, was due to carelessness on the part of the men in charge of the northbound train. This train, drawn by two engines, was ordered to meet the first section of the southbound at B and the second section at C. On arriving at B the first section of the southbound was found on the siding and passed. On arriving at C no stop was made and the second section of the southbound was met 300 ft. beyond the farther switch. The men in charge of the northbound train—the conductor and two enginemen—offer the explanation that an engine standing on the side track at C was mistaken by them for the second section (which they were to meet), but this "explanation" still leaves these men chargeable with gross negligence as the engine standing on the side track had white flags displayed (showing that it was not a regular train) and it was of a different number from that of the engine of the regular train which was to be met and the number of which was named in the meeting order. Both trains were running at full speed when they met.

Collision No. 1, in which six drovers, riding in the caboose of a freight train, were killed, occurred about midnight on a line which is used by the trains of several companies, and on which it seems the trains are run under somewhat peculiar rules. The freight train, belonging to road A, and consisting

of cars of live stock, was running over the track of line B, its trip over these tracks being for a distance of about four miles. It is the duty of the men in charge of all such freight trains to be constantly on the alert to protect their train from any train following; but it does not appear that they are required to keep themselves posted as to the times when following passenger trains are due. On the other hand, the rules limit the speed of passenger trains to 25 miles an hour. The passenger train belonged to road B. It had left the last preceding station about seven minutes behind the freight. According to the testimony before a coroner's jury (as reported by the railway company) the stock train was running at from 1 to 6 miles an hour at the time of the collision and the passenger train at from 12 to 40 miles an hour. From this last finding it would appear that the jury was unable to reach a definite conclusion, from the testimony, as to the speed of the passenger train. The only witness who thought that it was running at anything like 40 miles an hour was one of the drovers in the caboose of the freight train. The report of the railway company indicates that the flagman of the freight had neither made any effort to flag the passenger train nor thrown off any fuses; and that the engineman of the passenger train was running his train at a moderate speed, from which he could have stopped within 500 ft. if he had been flagged; and that he was keeping a good lookout. He had shut off steam preparatory to reducing speed to 12 miles an hour a little farther on. The conductor and the flagman of the freight appear not to have been well acquainted with the road. They declare that their train was moving at 10 or 12 miles an hour, but the coroner's jury evidently discredited this statement. The engineman of the passenger train and the conductor of the freight were men of long experience; the flagman of the freight, 23 years old, had been in the service about one year.

Collision No. 3 occurred on a double-track road about 3 a. m., and was due to errors of block-signal operators in arranging for the sending of a train east on the westbound track. Extra train 6 was to run eastward from B to C and an order was sent to C which required the telegrapher at C to hold all westbound trains until the arrival of extra train 6 at C. Just as this train left B, the signalman at C allowed a westbound train to pass toward B. The signalman at B accepted this westbound train for the reason, as he said, that he thought it was on the eastbound track. The superintendent, however, holds that there is no reason to justify such an impression on his part. The operator at B was 21 years old and had been in the service about one month. The operator at C was 22 years old and had been in the service of the company about six months.

Collision No. 7 was between southbound and northbound regular freight trains. An order was delivered that the northbound would wait at F until 12.20 a. m. for the southbound; then another order was sent to the effect that it would wait at B until 12.40 a. m. for the southbound; then a third order was sent saying that it would wait at F until 12.50 a. m. for the southbound, and "orders 140 and 135 are annulled." In delivering this order the operator wrote "40" in place of "140," though the superintendent is satisfied that in repeating it to the despatcher he repeated correctly; and the order was delivered so soon after it was received that it is not likely that the operator had time to rewrite it. The conclusion seems to be that in repeating the order he discovered his error and intended to add the figure "1" before delivering it; but he did not do so. By this mistake order No. 140 was left in force, and this caused the collision, as the other train affected by this annulled order had received a correct copy of the annulling telegram and was thus relieved from complying with that order. The conductor and the engineman of the southbound are held at fault for accepting an order annulling another order which they had not received. It should have occurred to them that something was wrong. The operator who made this mistake had had four months' experience. The conductor and engineman who accepted the suspicious order had had several years' experience.

Collision No. 12, occurring on a single-track line about 3 a. m., was due to the neglect of trainmen to exactly and properly identify each other's trains at a meeting point. Several extra passenger trains were to be run west from G. Some of these were run as sections of a regular train, and then, when the schedule of this train was 12 hours old, four additional passenger trains were run as specials. After the despatcher had issued his orders, making a number of meeting points for these four specials, it was decided to run a fifth. The fifth was run from one station to another ahead of the third and on the rights of the third. This was an irregular proceeding made apparently by the conductor of the train on his own authority, but in accordance with rule 94 of the standard code. This fifth train, now become the third, may be designated as No. 81. (A special passenger train is designated by the number of its engine.) It was running on the rights of No. 82, and the men in charge of it were taking care that no eastbound train should encroach on the rights of No. 82. On meeting an eastbound extra freight the engineman of No. 81 spoke to the engineman of the freight, describing the situation. The conductor of No. 81 was nearby, but did not participate in this conversation and did not know exactly what was said. The conversation between the enginemen should have been participated in and confirmed also by the conductor of the eastbound freight; but he, with a brakeman, was on the rear of his train, and although they noticed, on passing the westbound, that the engine was not the correct number that they expected, they assumed that their engineman had received suitable assurances from the man on the westbound and they took no action to prevent their engineman from proceeding toward the next station; and the collision occurred in three or four minutes afterwards. The primary trouble appears to be that the engineman of the eastbound had fixed in his mind the four westbound specials which were to be met, and did not realize that he had been informed that there were five trains.

Collision No. 15 was due to the neglect of a block signalman and of a flagman. An eastbound freight train was stalled at S, and a passenger train, following, was coupled to the freight in order to assist it up a grade. While the two trains were being coupled the flagman of the passenger went back with a red light. The coupling having been completed, the engineman of the passenger train sounded two blasts of the whistle, for the release of the brakes, and then repeated the signal. The flagman, wrongfully assuming that the sounds of the whistle authorized him to return to his train, did so return; but the combined train was slow in moving and the flagman went back a second time. Before he had gone far, however, he met a following passenger train running at 40 miles an hour, and the engineman of this train was unable to stop it before striking the one ahead of it.

The rear of the stalled passenger train was about 1,100 ft. ahead of a semaphore signal, which should have been set to stop the second passenger train, but which was left in the clear position. For this the signalman is held grossly negligent. From the next station in the rear, up to this signal, the manual block system was in effect, but that section of the line ahead of the signal and occupied by the stalled trains, being in the yard, was not worked under the block system. The operator who had left the signal wrongfully in the clear position had kept his distant signal set against the approaching train, but as the engineman could plainly see the home signal, he, of course, did not slacken speed at the distant. The signalman saw the second passenger train in season to have set the home signal against it, but he became confused and did not think to take such action. The engineman of the second passenger train is held blameworthy for not being properly alert approaching the station. The testimony shows that he

did not shut off steam until nearly or quite the moment at which he struck the train ahead.

Collision No. 18, between westbound freight train No. 33 and eastbound freight train No. 34, occurred one-half mile west of the station where the trains should have met, and was due to the failure of an operator to deliver the meeting order to the westbound train. Having a number of orders to deliver to that conductor, he delivered all but one of them. The despatcher was also held blameworthy because, in receiving the acknowledgment from the station operator of a number of orders for train No. 33, he failed to note that the particular order in question was not acknowledged. This despatcher had had eighteen years' experience—ten as an operator and eight as a despatcher. The station operator is 22 years old and has had eight years' experience, during the last four of which he has handled train orders. This collision occurred at 2 o'clock a. m. and the operator had been on duty about two hours. He declared that he was not sleepy.

Collision No. 19 was due to the failure of a station agent to deliver a meeting order, and to a misunderstanding in connection with an oral order given by the conductor to the fireman. Passenger train No. 3, northbound, and freight train No. 6, southbound, were to meet at S. An order had been issued to this effect, to be delivered to the passenger train at D, a station 7 miles short of S; but this order the agent at that point failed to deliver. The collision, however, is not to be charged wholly to this failure, because a part of the freight train had arrived at S before the passenger train reached that point. The freight train had been stalled about 2 miles before reaching S, and a part of its cars had been left standing on the main track, while the engine and the front part of the train went on to S. As this front portion was obliged to pass beyond the station at S, a flagman was sent forward to stop the passenger train, which he did. The passenger train after being flagged moved forward to the station. When ready to start its conductor spoke to the fireman, only about 30 ft. away from him, giving instruction that the train should be moved forward and then set back on to the siding to wait for the freight, the engine of which had gone back to haul in the rear portion of its train. The freight flagman, standing with the passenger conductor, also made a hand motion to the fireman, indicating the same thing. The fireman (who was subsequently killed in the collision) nodded his head and the train was started. When its rear end passed the switch, the conductor dropped off to turn the switch and then was astonished to find that the train, instead of stopping, kept on; and it soon collided with the freight train. The passenger engineman, as well as the fireman, was killed. Both engineman and fireman were experienced men and had worked together four years. Both men being killed, there is no explanation of how they came to misunderstand the situation and the orders given. The collision occurred at 3.25 p. m.

The agent at D, who failed to deliver the order to the passenger train, had resigned his position and was to leave the service the next day. He took this message and then seems to have depended on his prospective successor to deliver it, but without telling him to do so; and when the train came was out on the platform talking with an acquaintance, entirely forgetful of the order. There was no train-order signal at the station as, until a short time before that, the universal practice was to send all train orders by telephone direct to conductors, and always simultaneously to both of the conductors for which a meeting order contained instructions. The flagman who flagged the passenger train at S did not explain to the engineman the reason why the flag had been displayed.

Derailment No. 15 was due to mismanagement of the air brakes on a train consisting of 2 engines and 33 cars. The air-brake pipes were properly connected throughout the train. Parts of two trestle bridges were knocked down by the derailed cars, a car in the middle of the train being derailed first, at a curve, causing the derailment of the cars behind it, which were piled up in the ruins of a bridge which was encountered at that point and which was wrecked; and the forward part of the train ran some distance farther, when that also was derailed at a bridge, with the exception of the leading engine, its tender and the second engine, the tender of the second engine going off the track. Some little time after passing over a summit, the engineman of the leading engine, attempting to apply the brakes, discovered that there was no air pressure available. He sounded his whistle for the application of the hand brakes, and then went back to the second engine, but found that it was impossible to check the speed of the train there. By this time the train was running so fast that it was impossible for the brakemen to get from one car to another. It is the conclusion of the officers of the company that at the time the leading engine was attached to the train, for the purpose of assisting it up a grade, its engineman neglected to "cut in" his brake valve, so that for some distance the brake valves of both engines were cut out. During this time the air leaked from the train line, but so very slowly that the brakes were not applied by the reduction of pressure. The engineman of the leading engine was blameworthy in not noticing the condition of the air pressure, and also for not making the running test required by the instructions. The engineman of the second engine is at fault for not having seen that the leading engineman made the test as required. The conductor, who was in the caboose, neglected to notice the air gage. When the whistle was sounded for the application of the brakes, the conductor suddenly discovered that there was no pressure in the train line.

MOGUL LOCOMOTIVES FOR THE TIENTSIN-PUKOW RAILWAY, CHINA.

The Baldwin Locomotive Works have recently shipped to China two mogul locomotives intended for general road service on the Tientsin-Pukow Railway. The track gage is standard, and when compared with many six-coupled locomotives used on American roads this design appears of moderate capacity, as the tractive force developed is 22,100 lbs. The engines are, however, admirably adapted to the service required. It may be noted in this connection that while comparatively few mogul locomotives are being built for the principal American lines, there is a steady demand for this class of power from foreign roads.

The engines under notice have straight topped boilers with inside fireboxes of copper. The crown and sides are in separate pieces, and the tubesheet is increased in thickness from ½ in. to ¾ in. over the area where the tubes are inserted. The staybolts are of copper. The firedoor opening is formed with a ring which is riveted between the inside and outside sheets. The barrel is composed of two courses, and except for the construction of the dome, presents no unusual features. The dome body is of pressed steel and is bolted to the dome base. As the body can be easily removed, the throttle valve and its operating mechanism are readily accessible. The dry pipe is of copper.

The boiler is equipped for burning bituminous coal. The grate is of the rocking type with drop plate and the firebox contains a brick arch supported on studs. The smokebox is extended and is fitted with netting, an adjustable diaphragm plate and a high double nozzle. The stack is straight, 18 inches in diameter.

In many respects the most interesting features of these locomotives are the frames and running gear, which are designed, to a large extent, in accordance with foreign practice. The frames are of mild steel plate, 1¼ in. thick, and rolled in one piece for each side. With this construction the firebox can be placed above the rear driving axle and between the frames. It can thus be made of ample depth and of nearly the same width as the usual type of narrow firebox when placed on top of bar frames. The frame pedestals are bolted in place and, together with their binders, are of cast

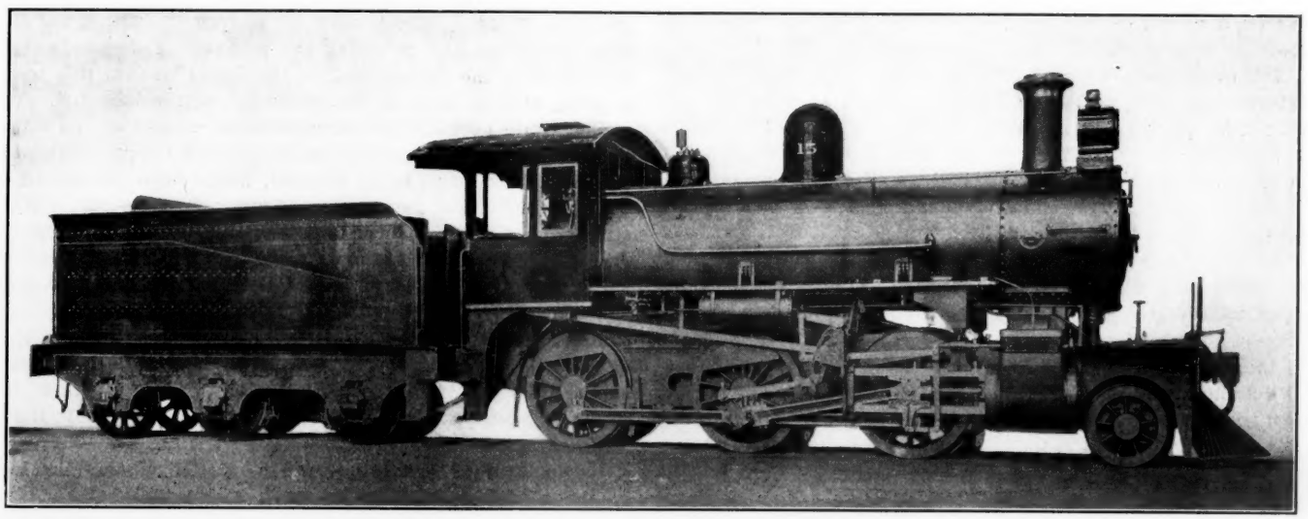
steel. The driving springs are underhung, and the loads on the main and rear drivers are equalized through beams fulcrumed under the frames. These beams are of cast steel, with an I-section. The front drivers are equalized with the engine truck as in American practice.

The driving boxes are of steeled cast iron and the driving wheel centers are of cast steel. The truck wheels are steel-tired, with cast steel centers.

Each cylinder is a separate casting, and the saddle, which supports the boiler and occupies the space between the frames, is made in one piece. The cylinders and saddle are lipped on top of the frames and securely held together by horizontal bolts. The steam distribution is controlled by Richardson balanced slide valves, driven by Walschaerts motion. The links are trunnioned on castings bolted to the guide bearers. The latter are of cast steel, each being formed in one piece with a broad vertical foot which fits up against the outside of the frame and is securely bolted into place. Between the guide bearers the frames are braced transversly by a deep cross tie. Similar ties are placed under the front of the firebox and ahead of the main driving axle. The frames are bolted, at the rear, to a cast steel foot plate.

The engineman is located on the right-hand side of the cab and the general arrangement of the fittings is similar to

Boiler, diameter of shell	61¾ in.
Boiler, thickness of sheets	⅝-in.
Steam pressure	180 lbs.
Fuel	Soft coal
Firebox, material	Copper
" length	87 in.
" width	40 "
" depth, front	75½ "
" depth, back	65½ "
" thickness, side and back sheets	½-in.
" " crownsheet	⅝-in.
" " tubesheet	¾-in. and ½-in.
" water space, front	3½ in.
" " " sides	2½ "
" " " back	3 "
Tubes, material	Iron
" thickness	No. 12
" number	238
" diameter	2 in.
" length	12 ft. 0¼ "
Heating surface, firebox	140 sq. ft.
" " tubes	1,489 "
" " total	1,629 "
Grate area	24.2 "
Wheels, diameter driving	60 in.
" " truck	36 "
" " tender	45 "
Journals, driving	8 in. x 10 in.
" truck	6 " x 10 "
" tender	6¼ " x 10 "
Wheel base, driving	15 ft.
" " engine	23 ft. 3 in.
" " engine and tender	46 " 3 "
Weight on driving wheels	101,800 lbs.
" on truck	23,150 "
" total engine	124,950 "
" engine and tender	221,000 "
Tank capacity, water	4,800 gals.
Tank capacity, coal	7½ tons



Mogul Locomotive for the Tientsin-Pukow Ry., China.

American practice. Two sand boxes are provided, and they are placed under the running boards, immediately in front of the leading drivers. The equipment includes British Westinghouse automatic quick-acting air brakes. Whitworth threads are used on all bolts, nuts and staybolts.

The tender is carried on three pairs of wheels and the loads on the second and third pairs are equalized. The frames consist of steel plates; they are placed outside the wheels and are strongly braced transversely between the axles. Steel plates are also used for the bumpers. The tank is wedge shaped and carries 4,800 gallons of water. The fuel space has a sloping floor throughout its entire length and accommodates 7½ tons of coal. The tender wheels, like those of the engine truck, are steel tired with cast steel centers, and were manufactured by the Standard Steel Works Company.

In general outline these engines present a pleasing appearance. They are simple in construction, and as the valve motion is entirely outside the wheels, the plate frames in no way prevent access to the working parts. The engines combine, to a marked degree, the flexibility of the American locomotive, with various structural features which are characteristic of European practice.

The following are some of the principal dimensions of the engine:

Gage	4 ft. 8½ in.
Cylinders, diameter	19 "
Piston stroke,	24 "
Service	Passenger and freight
Tractive effort	17,351 lbs.

$$\frac{\text{Weight on drivers}}{\text{Total weight}} = 81.47^*$$

$$\frac{\text{Weight on drivers}}{\text{Tractive effort}} = 5.98$$

$$\frac{\text{Total weight}}{\text{Tractive effort}} = 7.20$$

$$\frac{\text{Tractive effort x diameter drivers}}{\text{Heating surface}} = 638.95$$

$$\frac{\text{Heating surface}}{\text{Grate area}} = 67.31$$

$$\frac{\text{Firebox heating surface}}{\text{Total heating surface}} = 8.59^*$$

$$\frac{\text{Weight on drivers}}{\text{Total heating surface}} = 62.49$$

$$\frac{\text{Total weight}}{\text{Total heating surface}} = 76.70$$

$$\frac{\text{Displacement of 2 cylinders, cu. ft.}}{\text{Heating surface}} = 7.87$$

$$\frac{\text{Heating surface}}{\text{Displacement, 2 cylinders}} = 207.0$$

$$\frac{\text{Grate area}}{\text{Displacement, 2 cylinders}} = 3.07$$

* Per cent.

THE FACING POINT LOCK.*

BY W. H. ARKENBURGH.

Conservatism is the force which keeps alive many usages which might be relegated to the rubbish heap. We do a great many things because our fathers did them before us. Consider a mechanical interlocking switch. It is operated by a line of connections, of 1-in. iron pipe, from a lever. When the lever is thrown it pushes or pulls the pipe and thereby moves the switch points. To prevent the points from getting out of place by reason of lost motion a facing point lock is added. This is a plunger, working in a casting, operated by another lever in the same manner as the switch. When the facing point lock lever is reversed the plunger is forced through a hole in a lock rod which is attached to the switch points more or less securely and passes through the plunger casting at right angles to the plunger. When the lever is put normal the plunger is withdrawn. There are in the lock rod two holes, so that the plunger may pass through either and thus may hold the switch points in either position. Yet this is not enough. A bolt lock is provided (where convenient), so that in case the switch points fail to move and the plunger goes back into the same hole from which it was withdrawn, it will be impossible to clear a signal. Thus the mechanism of an interlocked switch consists of a means of throwing the switch, a means of locking it in both positions, and means of indicating its position.

Yet even when so equipped, is a switch reasonably well safeguarded? Records of performance would seem to indicate that it is; yet we find occasionally that some one of the three devices fails to act. The weakest point is the bolt lock. To most of the switches in any given route it is cumbersome and expensive to apply. Without the bolt lock we must depend on the facing point lock altogether, with the result that our trust may be betrayed in a number of ways. Pins can and do work out, despite cotter keys and other checks. Pipe lines sometimes break, as do also crank and compensator stands. These stands can work loose from their foundations or the foundations may move. From any one of these causes a switch may not respond to its lever, thus allowing the lock plunger to re-enter the hole in the lock rod from which it was withdrawn. Again, a switch may not complete its stroke, and a break in the facing point lock connections, or a loose part will allow the lock lever to be thrown. In either event the signalman has no intimation that anything is wrong. The lock rod or plunger or any other part of the mechanism can be removed, as in making repairs, and the working of the levers not be affected. In other words, nearly any failure through breakage, by removal of a part, or by reason of lost motion is what is known in block signal practice as a *clear failure*—it is not on the side of safety.

Now it is possible and feasible to provide a reliable check on the working of a mechanically interlocked switch. In one system of electric interlocking, that made by the General Railway Signal Company, a device is used which insures that a switch must be fully thrown and locked before an indication is received at the lever. If the plunger re-enters the hole from which it was withdrawn, i.e., if the lock rod does not move, no indication will be received at the lever. If any part is removed, as the lock rod or plunger, no indication will be received at the lever. This is accomplished by making the stroke of the indication controlling contacts dependent on the movement of the lock rod itself through its full stroke, and of the plunger through the hole in the lock rod. The stroke of the controller is completed by the end of the plunger after it has passed through the hole. To make protection complete only one thing further is necessary; that is to make the governing signal, when clear, lock the switch, and the switch, when unlocked, lock the signal in the stop position.

These safeguards may properly be called an electric bolt lock and they can be easily applied to a mechanically interlocked switch. A switch so equipped could be operated by a switch and lock movement, thereby doing away with one line of connections from the tower to the unit. One method of application would be to provide an electric lock on the signal lever to lock the latch down when the lever is normal and the lock de-energized. The circuit for the lock would pass through two controllers, one actuated by the locking plunger or plungers on the switch-and-lock movement and one by the lock rod itself. The controller actuated by the plunger should be carried on the dog of an electric lock situated at the switch and so arranged that when de-engerized the dog will drop into a notch in the end of the locking plunger when the plunger is in locking position and close the circuit when in this position only; when raised out of the notch or when dropped below it, because of the absence of the plunger, the circuit should be open. The circuit for this lock should be carried through a normally closed controller on the signal arm, a normally closed controller on the signal lever latch and a controller on the latch of the switch lever, so arranged as to be closed only with the latch up, but to be open with the latch down and the lever in either position.

With this arrangement the operation would be as follows: In lifting the latch of the switch lever the circuit for the electric lock on the plunger would be energized, raising the dog from the notch and releasing the plunger. This would open the circuit of the electric lock on the signal lever at this point, it being already open at the controller on the lock rod. The switch could now be thrown, closing the circuit of the signal lever lock through the controller on the lock rod; at the end of the stroke the latch, being lowered, would open the circuit of the plunger lock, allow the dog to drop into the notch, close the circuit of the signal lever lock through the contacts on the dog, and release the signal lever. Clearing of the signal would open the circuit of the plunger lock at both the lever and the blade, thereby holding the plunger in place. Any failure of any part of the apparatus, except an electrical cross, would prevent the movement of one of the levers concerned, thereby instantly calling attention to the fact that something was wrong. Absence of the plunger or lock rod would have the same effect.

In the case of power operated or slotted signals the lock on the signal lever might be omitted and the signal control circuit taken through the controllers as described for the lock circuit. The reason for making the lock at the switch act on the plunger rather than on the lock rod or some other part is that there is no strain on the plunger, consequently the dog would not be likely to jam; also it is desirable to detect the presence or absence of the plunger.

One great advantage of the arrangement here described would lie in its adaptability to use with electric detector locking. All the locks on switches in a single route or section of route could be combined on one circuit and be actuated by the latch on a route or key lever, or by a floor push, thus minimizing the amount of electrical apparatus needed in the tower; and the combined control circuit could be taken through the point of a track relay. Thus the presence of a train in the section would lock the plungers of the switches themselves, which is the theoretically correct method (compare with detector bar).

There is the matter of cost yet to be considered. It would be expensive to equip all signal levers with electric locks, but by suitable mechanical locking, a key lever could be provided which would have to be reversed before any dwarf or low-speed signal could be cleared and a lock attached to such lever. In that case more protection would be afforded than is now had when dwarf and low-speed signals are rarely bolt locked: as a matter of fact, even high-speed signals are usually bolt locked only with such *facing points* as occur between the signal and the tower; and when power signals are used there

*An article by Mr. Arkenburgh on "Bolt Locking" was published in our issue of April 3, 1908, and one on "Switch Adjustment," December 10, 1909.

is no equivalent of the bolt lock at all (a switch box merely controls the signal, it does not lock the switch). In many cases there would be an actual saving, in that, by doing away with the separate facing point lock, there would be fewer levers with their attendant connections between the tower and switches. Thus there would be economy of levers, pipe line and tower room. The saving probably would be comparatively small, however, as it is safe to say that the cost of the electrical apparatus would equal that of the mechanical material displaced. Perhaps there would be a saving of money in the size of tower needed in large plants. However, in view of the added safety and reliability secured, even an additional expenditure would seem warranted.

There is still another factor to consider, namely—operation. By the concentration of functions, fewer levers are needed for any given route, consequently fewer movements are required to set up a route. This would result in economy of time, which is frequently an important matter.

By adopting some such arrangement of apparatus as above suggested the following results would be gained at probably no additional cost over present practice. (a) Failures would be on the side of safety. (b) The equivalent of an *absolute* bolt lock would be secured for all signals. (c) Failures would be promptly detected. (d) Electric detector locking could be applied at the vital point, i. e., the locking plunger of the switch. (e) Fewer levers and their connections would be required, resulting in—(f) Economy of time in setting up routes, thus facilitating train movements.

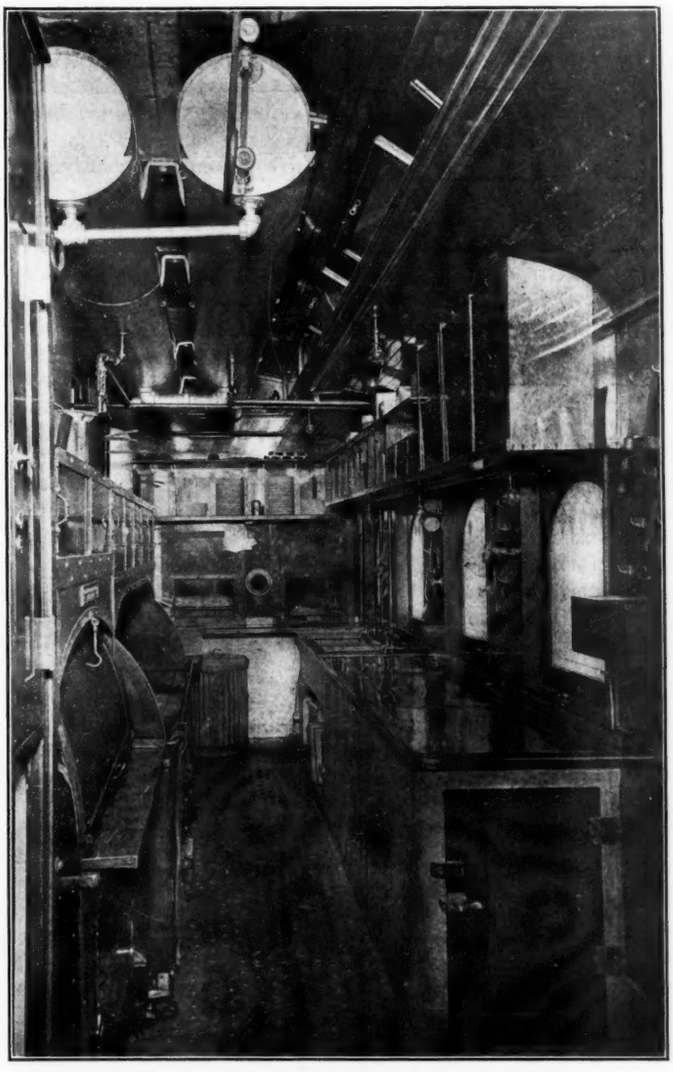
NEW YORK CENTRAL DINING CAR.

Dining car No. 405, recently completed at the West Albany shops of the New York Central & Hudson River, made its first trip from New York to Albany on the Lake Shore Limited on February 16. It will be used on this train and on the eastbound Twentieth Century Limited. This car incorporates some very novel features and may well be considered as near to perfection in the car builders' art.

It is 72 ft. 6 in. long and 9 ft. 8 in. wide over end and side sills, and 80 ft. 8¼ in. long overall. The dining room is 32 ft. 3 in. long, with five four-seat and five two-seat tables, giving an accommodation for 30 persons in all. The interior is finished in light mahogany and the decorations are light green. The beam ceiling design and the absence of protruding wall and ceiling decorations gives a large and roomy appearance, There are 15 electric lights in the dining room, arranged along the upper and lower decks.

The kitchen and pantry occupy a portion of the car 26 ft. 5 in. long and 6 ft. 8¾ in. wide. As the pantry is but 6 ft. 8 in. long, it leaves 19 ft. 9 in. for the kitchen alone, which is probably as great in length as any dining car kitchen in use. The half-tone illustration gives a very good idea of the kitchen arrangement. Just inside the door and to the left are several lockers, next to which is the broiler, then the range and the steam table. On the right side, as seen in the illustration, is, first the general work table, which also houses the egg trays, vegetable boxes, etc., and just beyond this are two sinks. A 12-in. table extends across the partition between the kitchen and pantry, and there are two small openings through this partition for passing the cooking to the pantry, where it is finally delivered to the waiters.

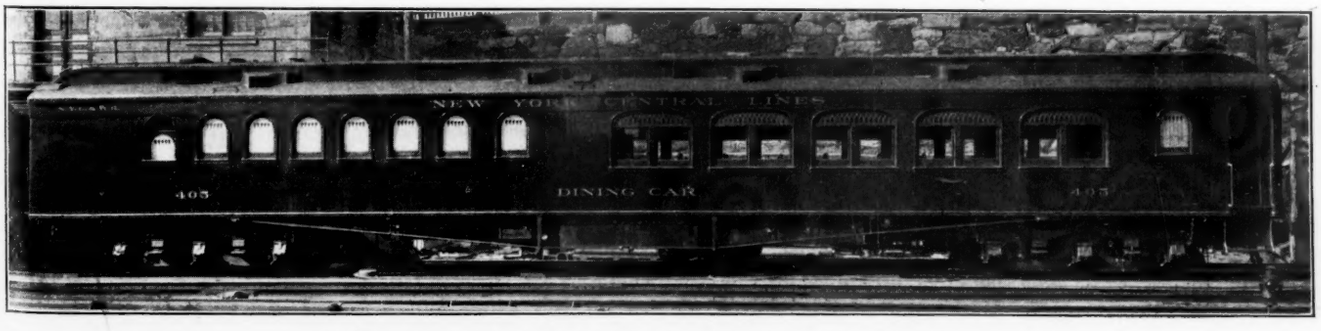
It will be noticed that one end of the car is apparently blind. This is so only on one side, there being but two side-vestibule entrances to the car instead of four. The space



Interior of Dining Car Kitchen.

thus gained is, on the kitchen end, used as an ice-box, which is charged from the roof. Adjoining the box is a 3-ft. 2½-in. x 2-ft. 10-in. refrigerator, which opens into the kitchen. The space gained in the vestibule on the opposite end of the car is devoted to a locker for water bottles.

This car requires a crew of 13 men, including one steward,



Dining Car No. 405; New York Central & Hudson River.

one cashier, one chef, four cooks, one pantryman and five waiters. The following special equipment has been used:

Curtain fixtures	Curtain Supply Co.
Couplers	Tower
Draft gear	Miner
Exhaust fan in kitchen	Diehl
Heating system	Ward Vapor
Refrigerator	Bohn
Steel underframe	Commonwealth Steel Co.
Steps	Standard Steel
Trap doors	Edwards steel
Ventilators	Garland
Window fixtures	Edwards

FREIGHT CAR SERVICE THROUGHOUT THE WORLD.

The conditions and rules under which freight cars are interchanged between different railways and under which this service is paid for, and demurrage is collected from consignees, form the subject of a note by W. F. Allen, secretary of the American Railway Association, which has been prepared for the next session of the International Railway Congress, and is printed in the *Bulletin* of the Congress. This "note" fills 225 pages of the *Bulletin*, and that it is full and detailed goes without saying.

Mr. Allen has gathered data from the managers of 430,000 miles of railway, using 3,800,000 freight cars, of which 250,000 miles of line and 2,200,000 cars are in North America (including Canada and Mexico). In this North America territory there are 80,000 towns and the freight cars belong to 900 owners, though four-fifths of the cars are owned by 56 companies. From one-fourth to one-half the cars are at all times away from home; that is to say, on the roads of companies other than their owners.

The problems connected with the car service seem to be the same throughout the old world that they are in the new. Elaborate regulations have to be made to compel railways to deal in perfect fairness with each other, and the shipper and consignee who take an unreasonably long time to load or unload a car are found in every clime.

In some countries borrowed cars are paid for by a combination of mileage and per diem rates, and again rates sometimes vary with the tonnage capacity. In Great Britain the mileage rate for cars running over 278 miles is less than one-half the rate charged for 58 miles or less. In some parts of Europe cars are charged for by 12-hour periods, or even one-hour periods, though in general the day of 24 hours is the unit. Since April 1 last a general freight car pool has been in effect in Germany.

In Russia the system of interchange is based on a rule of "car for car." An agreement between the Southern Railway of France and the Paris-Orleans Railway provides that differences, if less than 300 cars, shall be disregarded in balancing. In South Africa the Central South African Railway and the Cape Government Railway have a freight car pool for through traffic and no car hire is levied. A similar arrangement, dealing only with coal cars or ore cars, is found in America. The custom of allotting a certain period of time for the journey of a car and charging a per diem rate after that time is in quite general use, and in some cases there is also a heavy addition mileage charge.

The report goes quite fully into the question of rates in the principal countries, and an instance has been found in this country where the interchange rate is higher during the four heavy months of the year than during the eight light months.

Under the head of demurrage the report sets forth the complicated problem with which the railways of North America have had to deal, such as restrictions imposed by the laws of 49 legislatures, the unbusinesslike practices of the roads themselves in the past, the existence of over 100,000 cars not owned by the railways, and the great difference in the size and value of different cars. With all this our readers are familiar. In England the railways seem to be able to collect demurrage and keep it, and in times of car shortage "all applications for refunding demurrage are refused." Penalties for wrongful diversion seem to be very generally prescribed and, so far as can be judged by the report, these penalties are enforced. Elaborate statistics are given showing the average value of cars of different kinds in all parts of the world, but in the absence of information as to the size and capacity of cars these figures give little information. Under another head similar statistics are given showing the capacities of cars. In general it may be said that in European countries charges are adjusted much more closely to the actual or estimated value of the service than in this country. On the Midland Railway of England, for instance, no demurrage is charged on coal wagons, but after four days there is a charge of six pence a day for the use of the track. On the Caledonian Railway of Scotland, the demurrage on an ordinary car being three shillings a day, the rate rises to 12 shillings in the case of a car of 20 tons capacity and 20 shillings (or $4.85) on a car carrying 30 tons or more.

TRANSPORTATION OF PERISHABLE FREIGHT.

The question of "suitable measures for developing traffic in perishable freight" constitutes subject No. 16 for discussion at the eighth session of the International Railway Congress, which comes off at Berne, Switzerland, next July, and the report on the subject for English-speaking countries, by J. M. Culp, vice-president of the Southern Railway, is published in the December number of the *Bulletin* of the Congress. Mr. Culp discusses only briefly questions relating to loading and precooling, holding that this is a duty resting on the shipper; and he gives little information from countries outside the United States, because he was able to get only a few satisfactory answers to his questions; but as a review of the condition of American practice at the present day the report is very full and detailed. It fills over 80 pages in the *Bulletin*. Complete details are given of refrigerator car arrangements for the transportation of fresh meat, dairy products, vegetables, fish, eggs and beer, with drawings of cars, descriptions of methods and copies of regulations. Incidentally, much information is given concerning the progress of the last 20 years among shippers and merchants in this department of transportation. Statistics are given, as between important centers, of the volume of traffic in fresh beef, fruit, milk and other commodities. Notice is given also of the heating arrangements for shipping potatoes in winter. Shipments of potatoes from northeastern Maine in 1908 were over 15,000,000 bushels, or five times as many as in the year 1900.

In summing up Mr. Culp says that the protection of perishable property by ventilation and refrigeration has become an obligation on the carrier. The Railroad Refrigerator Service Association, made up of the most important carriers of perishables, has published a circular describing the whole business. The principal lessons emphasized by Mr. Culp are: first, that all heat must be thoroughly expelled from highly perishable animal and vegetable substances before shipment, and that the best information on the subject of refrigeration and preservation should be thoroughly disseminated among producers and handlers. The United States Department of Agriculture has issued a bulletin (No. 123) giving valuable information. Mr. Culp has not investigated the subject of rates of transportation because, he says, the rates in force have been fixed chiefly, if not entirely, by commercial conditions; by which he means, no doubt, that in other countries as well as in the United States the railways have been obliged to develop the traffic in fruit and vegetables at great expense, and have then been obliged to accept comparatively low rates in order to establish or stimulate that degree of consumption of these foods which will justify their transportation over long distances.

General News Section.

S. W. Johnston, station agent of the Pennsylvania at Mifflinburg, on the Lewisburg & Tyrone branch, is to retire next month, having reached the age of 70 years, and 75 agents at other stations have filed applications for his place.

The cars of the United States Express Company are now taken through from New York to St. Louis over the Baltimore & Ohio by special fast train leaving New York at 9 p. m., and arriving in St. Louis on the second morning at 2 a. m.

Two searchlights are now in use in the freight distributing yard of the Pennsylvania Railroad at Harrisburg, Pa. The use of these lights to facilitate the breaking up of incoming freight trains is said to have proved very satisfactory.

The St. Louis & San Francisco has given 45 scholarships for the short winter course of the agricultural college at the University of Missouri. These scholarships will amount to $100 each and will be given to those students in each of the 45 counties through which the road passes who make the best grades in taking the course mentioned.

The Interstate Commerce Commission announces that two men, J. S. Vaughn and —— Clark are fraudulently representing themselves as safety appliance inspectors for the commission in the Southwestern States. All inspectors of the commission carry credentials, which will be shown on request. No inspector has authority to interfere with the movement of traffic by giving directions to railway officers or employes.

The opening of the Pennsylvania Railroad's East river tunnel (New York) for passenger business will be delayed because of difficulty in getting materials, and the date now set for the running of the first passenger train is May 30. Trains will be run from the station at Seventh avenue and Thirty-second street, Manhattan, to Sunnyside, L. I., which is the eastern end of the tunnel, but through trains over the lines of the Long Island road will not be put on until a later date. The running of trains into the Manhattan station from the West will not be begun before September.

The Southern Pacific Co. has lately bought 600,000 acres of oil lands in Mexico. The company already owns 14,000,000 acres of land, which has been bought with a view to development of oil wells. According to the *Wall Street Journal*, the value of oil lands belonging to this company is $100,000,000. The locomotives of the company are now using 30,000 barrels of oil a day, more than half of which comes from wells other than those belonging to the company. Crude oil is now selling in California at about a dollar a barrel, as compared with 60 cents a year ago. Industrial establishments in California are now rapidly adopting the use of oil as fuel.

J. F. Wathey, formerly railway and financial editor of the *St. Paul Dispatch*, has been placed at the head of the recently organized department of the Great Northern for the supervision of passes. Following the revelation that the Great Northern and other roads had been mulcted largely in the issuance of trip passes, L. W. Hill, president of the road, determined to stop the illegal use of passes. Mr. Wathey began work the first of March and every officer who issues passes will report to him; and he reports to the president alone. He will scrutinize all passes and investigate all apparent irregularities. Mr. Wathey has been connected with Twin City newspapers for a number of years.

The Atchison, Topeka & Santa Fe has shortened the schedule of its westbound California Limited by 3 hours and 30 minutes, making the time of arrival at Los Angeles, Cal., 2:30 p. m., instead of 6 p. m., and the actual running time from Chicago to Los Angeles 68 hours and 30 minutes. This is nearly the same schedule that was in effect prior to the congestion of freight traffic in 1907, on account of which the schedule of this train was lengthened. There is to be no change in the eastbound schedule. The train will continue to leave Los Angeles at 10 a. m., and arrive in Chicago at 12 noon of the third day. Newspaper statements have been printed that on its revised schedule the California Limited will make the run between Los Angeles and Chicago in 20 hours' less time than any special ever has made it. This is absurd. The so-called "Scotty special," July 9, 1905, ran from Los Angeles to Chicago in 44 hours and 54 minutes.

The year book for 1910 of the American Society of Mechanical Engineers contains both a complete alphabetical list of the membership with information regarding the business, the membership of the society and the business and home addresses of each member, and also a geographical list with sufficient information regarding the business and address of each member to make the list useful to one traveling or to those who desire to correspond with members in any particular city or with a particular firm. The book also contains general information about the society, including the constitution, by-laws and rules and is issued in a size convenient either for the desk or to carry in traveling. It is bound in substantial board covers.

Parker & Bridge, New York, railway press agents, have issued a pamphlet showing the reasons why, in the face of a steady decline in rates and a steady advance in the cost of operation, the railways cannot afford to grant general increases in pay of employees. General increases were made in the latter part of 1906 and the early part of 1907, and there was no subsequent decrease, as there was in other industries, at the time of the 1907 panic. While the general average of freight rates has declined year by year, the price of everything a railway buys has gone up. The price of labor, it is declared, has moved upward along with all other prices, periodical advances in wages having been made by the railways. The average yearly earnings of railway employees, including laborers, according to the latest report issued by the Interstate Commerce Commission, amount to $641. The average yearly earnings of trainmen, including enginemen, firemen and conductors, on the eastern railways, according to the same report, are $908. Skilled workmen in other industries, according to the report of the Massachusetts State Labor Bureau, earned in 1907 average wages for the year ranging from $442 in the cotton goods industry, to $613 in the machinery trades.

Railway Matters in Washington.

Washington, March 2, 1910.

The administration railway bill has been so far agreed to by the House Interstate Commerce committee that it will be reported probably this week; and after but little discussion; but the provision for a commerce court was approved in the committee by a vote of 10 to 8. The strength of the minority would seem to indicate that there will be considerable discussion of the bill on the floor of the House. Mr. Mann, of Illinois, chairman of the committee, is one of those who voted against the commerce court provision.

The Senate committee considered the bill last week and ordered a favorable report, but in the Senate committee, as in the House committee, there was a strong minority, the vote on the bill being 6 to 4. The majority will recommend the passage of the bill practically as presented the last time, but it seems likely that there will be extended discussion on the floor of the Senate.

The Legislative Budget at Washington.

Washington is still engaged in the none too edifying process of reducing the number of measures it intends to pass into law. The administration is not likely to get much of what it has recommended, but among the possibilities is the amendment to the interstate commerce act, giving the commission power over the issue of new capital to be sold under par. This confers upon the greater railways a dangerous monopoly in freeing them from the fear of smaller competitors by limiting expansion to those roads whose securities sell above par. The administration apparently does not want to know the facts in this matter, and perhaps the most exasperating phase of the

situation is that real public interest is sacrificed to the end of offering something which will look imposing when presented to the people in the coming congressional campaign. President Taft has complained that the newspapers misrepresent him. They would soon cease to do so if he demonstrated that he was bigger than his party. The criticism to which he objects is largely due to a belief that he regards the Republican machine as something as important as the presidency of the United States. No one will receive more severe or deserved criticism than Senator Aldrich in the coming campaign, but he gets more considerate treatment than the President. He earns the respect due to one who really knows what he wants. He may not be entitled to it, but the American people have little patience with the politician who only knows what he does not want.—*Wall Street Journal.*

Wages.

The Western Maryland has made an increase of 10 per cent. in the pay of telegraph operators.

The Delaware & Hudson has received applications for increases in pay from enginemen, firemen and telegraphers.

The Baltimore & Ohio increased the pay of its telegraphers an average of 9 per cent. and has made other concessions, which include a reduction to nine hours a day for 10-hour operators; 15 days' vacation yearly with pay to the 12-hour men and an agreement providing that where the telephone supersedes the telegraph for dispatching the telegraphers shall be transferred to the telephone service, with the same salaries and privileges. About 1,500 operators are affected by these changes.

The chief officers of the brotherhoods of conductors and trainmen report that numerous railways, including 25 companies in the South, reject the demands which the employees have made for increases in pay; but the understanding appears to be that negotiations will be continued, with a view to seeking agreement on some of the points at issue. President Daniel Willard, of the Baltimore & Ohio, has expressed willingness to submit to arbitration the questions relating to wages which have been presented by the conductors and trainmen of that company.

Forestry and Timber Preservation on the Pennsylvania.

The Pennsylvania Railroad has planted 3,482,186 trees since it undertook forestry work on a comprehensive scale, as shown in the table below. Prior to last year, the Pennsylvania's forestry operations were confined to a limited area between Philadelphia and Altoona, but in 1909 about 7,800 trees were planted at Pomeroy, Pa., 188,200 at Vandyke, Pa., 35,000 near New Brunswick, N. J., 352,000 near Eyer, Pa., 30,000 on the right of way near Metuchen, N. J., 161,825 at Denholm, Pa., 204,500 at Conewago, Pa., and 74,500 at Parkton, Md.

The total number of plants shipped during last year from the company's forest nursery at Morrisville, Pa., was 1,240,381. Ornamental shrubbery, for use around stations, is raised at the nursery. There are now 56,000 trees and shrubs growing there. The Pennsylvania Railroad's forestry enterprise is declared to be the largest ever undertaken by any corporation. The record shows:

Year.	No. of trees planted.	Year	No. of trees planted.
1902.....	13,610	1907.....	448,226
1903.....	43,364	1908.....	300,530
1904.....	223,656	1909.....	1,054,010
1905.....	597,165		
1906.....	801,625	Total.....	3,482,186

Under the direction of the forester, a large pressure timber-treating plant has been in operation at Mount Union, Pa., since July 1, 1909, and a small experimental non-pressure plant has been installed at Greenwich Point, Philadelphia. A second pressure plant is now under construction at Greenwich Point, and with all three in operation the total output will be about a million and a half ties yearly. There have been creosoted up to December 31 at Mount Union, 182,352 ties, 80,000 ft. of bridge timbers, 25,000 lineal ft. of trunking and capping for signal wires, and 25,000 wood paving blocks. The non-pressure plant at Greenwich Point has turned out ties and timber equivalent to 432,000 ft., also 5,000 fence posts and 25,000 paving blocks.

Workmen's Insurance and Benefit Funds.

There are in the United States 1,200 insurance and benefit funds, of which 84 are connected with national organizations, such as railway brotherhoods and other labor unions. All of these pay death benefits; the amounts range from $15 to $4,500. The most common figure is $100. Nineteen of these organizations pay temporary disability benefits, mostly less than $6 a week. Four have superannuation benefits and five others intended (in 1907) to establish these.

Of the local labor organization funds, as distinguished from national, 530 were investigated, representing about 90 trades. A few of these, in highly paid occupations, grant benefits as high as $10 or $15 a week, but the most common rate is $5. Of the railway relief funds there are 50, of which 14 have connected with them pension systems maintained entirely by the employing companies.

Over 400 funds have been found connected with factories, mines, street railways, etc., most of which are managed by the employees, though 32 are managed by the establishments and 88 jointly. A number of railways and industrial establishments maintain hospital funds, mostly supported by the contributions of the workmen.—*Twenty-third annual report,* Commissioner of Labor, Department of Commerce and Labor.

International Railway Congress.

W. F. Allen, of New York, secretary of the American Section, reports that about 75 or 80 officers of American railways are likely to attend the eighth session of the Congress, which is to be held at Berne, Switzerland, July 3 to 16. American railways are entitled to send about 400 delegates. Most of the roads have appointed a full list in order to receive the reports, and it is possible that some of these appointees will be able to attend. The government of the United States has the appointment of eight delegates, and the announcement of six of these—Franklin K. Lane, E. E. Clark, Fairfax Harrison, W. A. Garrett, H. S. Haines and J. A. Brown—has been noticed in these columns. The American Railway Association sends its president and general secretary and six others. The appointments so far decided are Arthur Hale, J. F. Wallace and Wm. Mahl.

The following named delegates of their respective roads are expected to attend:

Atchison, Topeka & Santa Fe Railway.—J. W. Kendrick, vice-president; Max E. Schmidt, consulting engineer.

Central Railroad of New Jersey.—W. G. Besler, vice-president and general manager.

Chesapeake & Ohio Railway.—Geo. W. Stevens, president.

Chicago, Burlington & Quincy Railroad.—F. H. Clark, general superintendent motive power.

Chicago, Indianapolis & Louisville Railroad.—W. H. McDoel, director.

Chicago, Peoria & St. Louis Railway of Illinois.—C. H. Warren, chairman executive committee; W. W. Wentz, director; J. P. Ramsey, chief executive officer.

Chicago, Rock Island & Pacific Railway.—H. U. Mudge, president; John Sebastian, third vice-president; J. B. Berry, chief engineer.

Chicago & Alton Railroad (Minn. & St. Louis R.R.).—L. F. Day, director.

Cumberland & Pennsylvania Railroad.—C. L. Bretz, general manager.

Cumberland Valley Railroad.—M. C. Kennedy, vice-president and general superintendent.

Delaware & Hudson Company.—L. F. Loree, president; C. S. Sims, second vice-president and general manager; C. E. McKim, general superintendent transportation; G. H. Burgess, chief engineer; J. H. Manning, superintendent motive power; W. J. Mullin, general traffic manager.

Delaware, Lackawanna & Western Railroad.—E. E. Loomis, vice-president.

El Paso & Southwestern Railway.—A. C. James, vice-president; C. H. Dodge, vice-president; H. J. Simmons, general manager.

Erie Railroad.—C. W. Buchholz, consulting engineer.

Grand Trunk Railway.—E. H. Fitzhugh, first vice-president.

Illinois Central Railroad.—J. T. Harahan, president; J. H. Mallory, general European agent; J. Ogden Armour, director; J. G. Shedd, director; Cornelius Vanderbilt, director; Chas. A. Peabody, director; R. S. Lovett, director; Robert Walton Goelet, director.

Kansas City, Mexico & Orient Railway.—E. Dickinson, vice-president and general manager; A. E. Stillwell, president.

Lake Shore & Michigan Southern Railway.—C. E. Schaff, vice-president.

Lehigh & New England Railroad.—R. H. Wilbur, vice-president and general manager; W. J. Turner, vice-president and general counsel.

Long Island Railroad.—J. A. McCrea, general superintendent.

New York Central & Hudson River Railroad.—A. H. Smith, vice-president and general manager; J. F. Deems, general superintendent motive power, rolling stock and machinery; P. H. Dudley, consulting engineer.

Norfolk & Western Railway.—N. D. Maher, second vice-president and general manager.

New Orleans, Mobile & Chicago Railroad.—W. F. Owen, general manager.

Pennsylvania Lines West of Pittsburgh.—W. C. Cushing, chief engineer maintenance of Way.

Pennsylvania Railroad.—R. M. Patterson, superintendent freight

transportation; G. W. Creighton, general superintendent; H. A. Jaggard, superintendent Elmira division.

Philadelphia & Reading Railway.—Theo. Voorhees, vice-president; A. T. Dice, general superintendent; H. D. Taylor, superintendent motive power and rolling equipment; C. H. Ewing, engineer maintenance of way; J. S. Ward, resident engineer.

Pittsburgh, Shawmut & Northern Railway.—F. S. Smith, receiver; F. B. Lincoln, assistant to receiver.

Quebec Central Railway.—E. Dent, president; Alex. Bremner, F. H. Norman.

Richmond, Fredericksburg & Potomac Railroad.—Wm. H. White, president.

St. Louis Southwestern Railway.—F. H. Britton, vice-president and general manager.

Staten Island Rapid Transit Railway.—G. H. Campbell, vice-president

Southern Railway.—Fairfax Harrison, vice-president; J. M. Culp, vice-president; A. H. Plant, comptroller; A. Stewart, general superintendent motive power and equipment.

Union & Southern Pacific Systems.—Wm. Mahl, vice-president.

In addition to the foregoing the following reporters on subjects to be considered at Berne are expected to be present: D. F. Crawford, Pennsylvania Lines West of Pittsburgh; Wm. Garstang, Cleveland, Cincinnati, Chicago & St. Louis, and R. L. Ettenger, Southern Railway.

The American Railway Association has secured rooms for headquarters of the American delegates on the first floor of the Bernerhof (hotel), which immediately adjoins the Parliament building, at Berne, in which the sessions are to be held.

Testimonial to Thomas Reynolds.

Thomas Reynolds, conductor of the Candian Pacific passenger train which was wrecked at Webbwood, Ontario, on January 21, was called to Montreal on Monday last to receive, at the hands of Sir Thomas G. Shaughnessy, president of the road, a gold watch and a check for $500. Conductor Reynolds, though himself seriously hurt, succeeded in saving eight passengers from one of the submerged cars by diving beneath the surface of the water, breaking a window and rising to the surface on the outside of the car. President Shaughnessy said that the gift was designed to express the company's appreciation of a conductor who understood that self-sacrifice and devotion to duty are a part of the railway man's life as well as of the soldier's.

The Erie's Cows.

The "Milk Production Special" is the latest novelty. It is a product of the genius of the industrial commissioner of the Erie. He is to furnish a train to carry lecturers from the New York States School of Agriculture around among the farmers of the southwestern part of the state. Cows "of different kinds" will be taken along on the train so that the audiences cannot possibly miss any of the points made by the lecturers. The first trip will be made April 12. For fear that the lecturers' supply of subjects may run out before the railway men's enthusiasm is appeased, we suggest that some road ought to give the farmers' wives a little attention. Why not the Washing Machine Express or a course of lectures on Butter making and Bulb culture?

The Ticker, with Music.

The Rock Island Lines on March 1 established a telegraphic news service on the Rocky Mountain Limited between Chicago and Colorado points, similar to that previously established on the Golden State Limited. These trains also have Victrola musical recitals and complete stock market quotations.

General Passenger and Ticket Agents.

The Fifty-fifth Annual Convention of the American Association of General Passenger and Ticket Agents will be held at the Centro de Dependientes, Padro 61, Havana, Cuba, March 28. The subjects to be discussed are: Association Ticket Paper; Uniformity in Prepaid Ticket Orders; Ticketing Special Baggage Cars for Interline Movements; Relations with Accounting Officers' Association; Standard Ticket Contracts; Uniform Interline Tickets and Minimizing the Use of Exchange Orders.

There will be a proposition to amend the constitution to provide that the name of the association be changed to read American Association of Passenger Traffic Officials. The principal address will be given by Alexander Hilton, general passenger agent of the St. Louis & San Francisco. The secretary of the association is C. M. Burt, Boston.

American Society of Civil Engineers.

At the meeting held on March 2, a paper was given by John H. Gregory, M. Am. Soc. C. E., entitled, "The Improved Water and Sewage Works of Columbus, O." This paper was printed in proceedings for January, 1910.

Southern and Southwestern Railroad Club.

The Southern and Southwestern Railroad Club, Atlanta, Ga., has elected the following officers for the ensuing year: President, F. F. Gaines, Central of Georgia; first vice-president, A. J. Poole, Seaboard Air Line; second vice-president, J. F. Emerson, Central of Georgia; third vice-president, C. H. Rey, Louisville & Nashville; secretary, A. J. Merrill; treasurer, Horace Parker; executive committee, J. H. Watters, chairman, Georgia Railroad; E. H. Barnes, secretary, and J. J. Hanlin, Seaboard Air Line.

Omaha Railway Club.

At the meeting of the Omaha Railway Club on the evening of March 9, Joseph B. Sheldon, superintendent of telegraph of the Union Pacific, will read a paper on "Despatching Trains by Telephone." He will be followed by Dr. Frederick H. Milliner, experimental electrician of the Union Pacific, who will make an address on the "Possibilities of Handling Railway Trains by Wireless Telegraphy." This is a subject to which Dr. Milliner has been giving his attention for some time.

Mechanical and Electrical Engineers.

The American Society of Mechanical Engineers and the American Institute of Electrical Engineers will hold a joint meeting in the Engineering Societies' building, New York, on March 8, with a paper by H. G. Stott, member Am. Soc. M. E., superintendent of motive power of the Interborough Rapid Transit Co., New York, and R. J. S. Pigott, entitled "Tests of a 15,000-kw. Steam Engine-Turbine-Unit." The paper relates to the installation of low-pressure turbines at the 59th street station of the Interborough Rapid Transit Co., New York, and presents a discussion of the most important development in steam engineering since the commercial introduction of the steam turbine.

American Society of Mechanical Engineers.

The next monthly meeting in Boston will be held Friday evening, March 11, in the auditorium of the Edison Electric Illuminating Co. The Boston Society of Civil Engineers and the Boston Section of the American Institute of Electrical Engineers will co-operate in the meeting. The paper, "The Training of Men—A Necessary Part of the Modern Factory System," will be presented by M. W. Alexander, member Am. Soc. M. E., who has been so long identified with the educational work and the training of the apprentices at the works of the General Electric Co., West Lynn, Mass.

The spring meeting of the society will be held at Atlantic City May 31 to June 3, with headquarters at the Marlborough-Blenheim. On Wednesday evening, June 1, honorary membership will be conferred upon Rear-Admiral Geo. W. Melville, U. S. N., retired, past-president of the society.

The Spokane Transportation Club.

The leading railway men of Spokane have formed a social organization with the following officers: Executive committee, Waldo G. Paine, Spokane & Inland Empire; J. T. Andrus, North Coast; H. N. Kennedy, Northern Pacific; H. G. Hawkins, Chicago Great Western, and H. S. Collins, Chicago & North Western. The executive committee elected Waldo G. Paine, president; J. T. Andrus, first vice-president; H. N. Kennedy, second vice-president, and also named J. W. MacIntosh, S. & I. E., as secretary, and R. L. Ford, Chicago, Milwaukee & St. Paul, as treasurer.

The aim of the new organization is to promote friendship and sociability, and it was decided that all railway officers, including chief clerks, shall be eligible to membership. The new club will meet at luncheon the second and fourth Saturdays of

each month. At the next meeting, March 8, the new organization will entertain the North Pacific Coast Passenger Agents' Association, which will be in session in Spokane on that day.

At the first regular meeting of the new organization, held on Feb. 22, much enthusiasm was shown, over 50 railway men being present. Every steam and electric railway at present doing business in Spokane was represented.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; May 10-13; Indianapolis.
American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.; June, 1910; Niagara Falls, Ont.
American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.; Havana, Cuba; March 28.
American Assoc. of Local Freight Agents' Ass'ns.—G. W. Dennison, Penna. Co., Toledo, Ohio.
American Ass'n of Railroad Superintendents.—O. G. Fetter, Carew Bldg., Cincinnati, Ohio; March 18; Chicago.
American Institute of Electrical Engineers.—R. W. Pope, 33 West 39th St., N. Y.; 2d Friday in month; New York; March 30-April 1; Charlotte, N. C.
American Railway Association.—W. F. Allen, 24 Park Place, New York; May 18; New York.
American Railway Bridge and Building Association.—S. F. Patterson, B. & M., Concord, N. H.
American Railway Engineering and Maint. of Way Assoc.—E. H. Fritch, Monadnock Bldg., Chicago, March 14-17, 1910; Chicago.
American Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis; second Tuesday, May; Memphis, Tenn.
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony Building, Chicago; June 20-22; Atlantic City.
American Society for Testing Materials.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; New York; May 31—June 3; Atlantic City.
American Street and Interurban Railway Association.—B. V. Swenson, 29 W. 39th St., New York.
Association of Am. Ry. Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; June 29, 1910; Colorado Springs.
Association of Railway Claim Agents.—E. H. Hemus. A., T. & S. F., Topeka, Kan.; May 25-27; Chattanooga, Tenn.
Association of Railway Telegraph Superintendents.—P. W. Drew, Wisconsin Central Ry., Chicago; May 16-20, 1910; Los Angeles.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 24 Park Place, N. Y.
Buffalo Transportation Club.—J. N. Sells, Buffalo.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.: 1st Tues. in month, except June, July and Aug.; Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, Montreal, Que.: irregular, usually weekly; Montreal.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton Bldg., Pittsburgh.
Freight Claim Association.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.; June 15, 1910; California.
International Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., N. Y.; May 24-27; Niagara Falls, Ont.
International Railway Master Blacksmiths' Ass'n.—A. L. Woodworth, Lima, Ohio; Aug. 16-18; Detroit, Mich.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago; May 23-26; Chicago.
International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; May; Cincinnati.
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
Master Car Builders' Association.—J. W. Taylor, Old Colony Bldg., Chicago; June 15-17; Atlantic City.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.: 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
North-West Railway Club.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
Northern Railway Club.—Fourth Saturday in month; Duluth, Minn.
Omaha Railway Club.—A. H. Christiansen, Barker Blk.; 2d Wednesday in month.
Railroad Club of Kansas City.—Third Friday in month; Kansas City.
Railway Club of Pittsburgh.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
Railway Signal Association.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.; March 14; Chicago
Railway Storekeepers' Association.—J. P. Murphy, Box C., Collinwood, Ohio; May 16-18; St. Louis.
Railway Telegraph and Telephone Appliance Ass'n.—H. M. Buck, Secy.-Treas., 30 Church street, New York.
Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
Society of Railway Financial Officers.—C. Norquist, Chicago.
Southern Association of Car Service Officers.—J. H. O'Donnell, Bogalusa, La.
Southern & Southwestern R.R. Club.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., Mar., July, Sept. and Nov.; Atlanta.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R. R. R., East Buffalo, N. Y.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg; 2d Monday, except June, July and August; Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
Western Society of Engineers.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Chamber of Commerce of Buffalo, N. Y., has established a traffic bureau, and the director of the bureau is William H. Fredericks.

The National Railways of Mexico and the Mexican Railway have pooled their traffic between Vera Cruz and Mexico, and the office of the Mexican Railway in New York City has been closed.

Sleeping cars between Nashville, Tenn., and Knoxville, over the Southern and the Tennessee Central, which had been taken off, have been put back in service, the Southern Railway announcing that this is done in deference to the request of the State Railroad Commission.

The New York, New Haven & Hartford has filed with the Interstate Commerce Commission new tariffs on freight to the West by way of the Canadian Pacific, showing increases throughout the list from the basis of 69 cents per 100 lbs. (first-class) from Atlantic coast points to Chicago, to 75 cents.

The Carolina, Clinchfield & Ohio, which has completed its line to Spartanburg, S. C., has made a traffic agreement with the Southern Railway for shipment of coal from the mines on the C. C. & O. line to Charleston, S. C. It is said that rates will be the same to Charleston as by other roads to Norfolk, Va.

The differences between the trunk lines and the New Orleans lines concerning carload rates on sugar to central western points were considered at a conference in New York City this week. A tentative plan of settlement has already been adopted, but, as in the past, the prospects seem much better for protracted negotiations by correspondence than for a settlement.

The Missouri, Kansas & Texas on Feb. 23 raised its passenger rates in Oklahoma from two cents a mile to three cents. This followed the issuance of an injunction by Judge Hook of the Federal court, restraining the officers of the state from enforcing the two-cent fare provision of the state constitution. It is understood that the Santa Fe is now revising its tariffs and will advance its fares as soon as the revision is done.

The Western lines have announced the same advance in their rates on fresh meats from St. Joseph, Mo., and from points west of the Missouri river as they previously had announced from Omaha (*Railway Age Gazette*, Feb. 25, page 421). They have also announced the same percentage of advances in the rates on these commodities from St. Paul and Minneapolis. Corresponding advances are to be made in the rates on live stock. The live stock rate from St. Joseph and Omaha, like that on fresh meat, will be 23½ cents. Rates from the Missouri to the Mississippi river will be advanced from 13½ to 14¾ cents. The live stock interests at Chicago are protesting because the increase from the Missouri river to Chicago is so much greater than to St. Louis.

The Manufacturers' Railway of St. Louis, which is controlled by the Anheuser-Busch Brewing Co., has filed a petition in the Federal court at St. Louis for an injunction to restrain the 14 railways composing the Terminal Railroad Association of St. Louis, and five other lines, from discontinuing through rates in connection with the Manufacturers' Railway. Several manufacturing concerns join in the petition. The railways served notice December 31 that the through rates would be discontinued March 1. The reason assigned was that the divisions of through rates which were being given to this company was really "tap line" allowances such as have been condemned by the Interstate Commerce Commission. The Manufacturers' Railway declares that this statement is an evasion, and that the action of the road is prompted by the fact that D. M. R. is becoming a competitor of the St. Louis, Iron Mountain & Southern.

The Chicago, Rock Island & Pacific and the St. Louis & San Francisco on February 24 filed suits in the United States circuit court for the Western district of Oklahoma to enjoin the enforcement of the 2-cent fare provision of the Oklahoma constitution and 11 freight rate orders that have been issued by the Corporation Commission. These suits are similar to

those in which the Missouri, Kansas & Texas, the Atchison, Topeka & Santa Fe, the Gulf, Colorado & Santa Fe and the Midland Valley already have got injunctions. The Frisco claims that in the year ended June 30, 1909, it was able to earn but 3.02 per cent. on the value of its property devoted to the handling of state passenger traffic and only 3.52 per cent. on the value of its property devoted to the handling of state freight traffic. The Rock Island alleges that it is losing about $1,000,000 a year on its state business in Oklahoma, the loss being about equally divided between freight and passenger business.

The Traffic Club of Chicago was addressed by E. E. Clark, Interstate Commerce Commissioner, at its monthly meeting on March 1. The annual election of the club will take place on Tuesday evening, March 29, and will be followed by an informal smoker.

The nominating committee, of which L. J. Herbison is chairman, has nominated the following officers for the ensuing year: President, John T. Stockton; first vice-president, Frank P. Eyman; second vice-president, W. M. Hopkins; third vice-president, C. L. Lingo; treasurer, John H. Grace; secretary, Guy S. McCabe; directors for two years, O. F. Bell, J. Charles Maddison, W. H. Johnson and George E. White.

Mr. Stockton, who has been nominated for president, is president of the Joseph Stockton Transfer Company, and has been secretary of the club since its organization. Probably he did more to put it on its feet and to make it a success than any other member, and his nomination for president is a mark of the members' appreciation.

The Chicago Board of Trade on February 28 got an order from Judge Kohlsaat, of the federal court, restraining the railways entering Chicago from putting ino effect on March 1 the uniform code of demurrage and storage rules. These rules, as is well known, were formulated by the National Association of Railway Commissioners and recommended for adoption by this association and by the Interstate Commerce Commission. The Chicago grain interests have always objected to them because of the fact that in Chicago as elsewhere they restrict the time for unloading cars to 48 hours. Heretofore the grain dealers at Chicago have been allowed 48 hours in which to reconsign grain and 72 hours in which to unload it at the elevators. The new rules, besides reducing the time for unloading to 48 hours, also reduces the time for reconsigning to 24 hours. The grain men say it will be impossible for them to conduct business on the proposed basis. It is necessary, they say, for them to have two sessions of the board of trade subsequent to the inspection of grain in which to sell and reconsign it, and that the volume of grain handled at the Chicago market is such that unloading in 48 hours is impracticable. The railway managers contend, on the other hand, that if the handling of grain requires more time than the handling of other commodities, the grain men, and not the railways, should bear the expense. Arguments on the question of making the injunction permanent will be heard on March 15.

James C. Clow, of James P. Clow & Sons, Chicago, has published an article opposing President's Taft's recommendation for legislation to fine a railway $250 for the misquotation of a rate. Mr. Clow advocates legislation to require the carrier to quote rates in writing. Instead of fining a road for making a mistake he would have the law provide that in case of a mistake the shipper should pay the legal rate and then file and collect the claim for the difference between the rate charged him and the legal rate through the Interstate Commerce Commission. Mr. Clow says in part: "Everyone will therefore probably agree with Mr. Taft that a carrier should quote its tariffs, but of what use will such quotations be to shippers if they have no legal claim against the carrier in case of error? Mr. Taft proposes to fine a railway for making an error in quoting a rate for the avowed purpose of making it more careful. But it isn't care the shipper wants; he wants a rate he can depend upon. He doesn't want revenge—he wants redress. Fines can never prevent mistakes, and a fine that accrues to the government is no benefit to the person injured. Nor is a fixed fine equitable. Everyone is liable to err; and whatever care may be taken, wrong rates will sometimes be quoted. Is it then fair that an error causing a loss of say $5 should be punished by a fine of $250? This doctrine is in keeping with the popular principle of supervision of railways: When in doubt, fine them. The only excuse for a fine when there is no criminal intent is to render mistakes profitless, and for the purpose of defraying the cost of maintenance of the tribunals those mistakes alone necessitate it being just and proper that the wrong rather than the right should bear the burden the wrong creates."

Harriman Lines Merger Suit.

At the continuance of the Harriman merger suit hearing W. L. Park, superintendent of the Union Pacific, resumed his testimony, telling first of a fast freight train, called the Nellie Bly Special, operated in 1897 between Council Bluffs and Ogden.

This train, adopted in connection with Central Pacific as a war measure against the Oregon Short Line, was operated on a 32-hour schedule for about 60 days, thereafter on a 53-hour schedule until 1900. On descending grades this train frequently made a speed of 50 miles an hour. Inspection was curtailed, and engines and cabooses were exchanged without stopping the train by the use of flying switches. Mr. Park characterized this train as entirely impracticable unless other freight and many passenger trains were to be sidetracked. Mr. Park pointed out, in reply to query of N. H. Loomis, counsel for Union Pacific, that movement of freight was greatly retarded during the making of improvements under traffic after the advent of Mr. Harriman, also after the San Francisco disaster.

On September 1, 1907, the fast freight, with a schedule of 74 hours and 30 minutes, left Council Bluffs on time, and arrived at Ogden 93 hours late; on September 5, 54 hours late; on September 15, 55 hours and 40 minutes late. After the lengthening of the schedule to 100 hours and 45 minutes, out of 20 trips this train was on time 11 trips, and only 5 hours and 54 minutes late on an average the other nine trips.

By lengthening schedules, engines were enabled to haul greater loads, the only practical solution of the problem of congestion. Mr. Park stated that, in his opinion, considering the volume of traffic and high altitudes, with heavy winds and generally adverse climatic conditions, the ideal speed for freight trains between Council Bluffs and Ogden is between 10 and 12 miles an hour, requiring a speed on certain divisions of between 15 and 20 miles an hour.

Mr. Park contrasted Union Pacific's train load of 1,538 gross tons in 1909 with that of 901 gross tons in 1901.

Counsel again brought out the significance of precautions against accident, reducing the number of train accidents per million locomotive miles between 1902 and 1907 from 20 to 10. Mr. Park ascribed much of this result to the Union Pacific school train of three cars, which is kept constantly on the road for training employees in the handling of trains and to enable a continual physical examination of the men. In 1907 the proportion of employees killed in accidents was only one in 418.

Mr. Park characterized the signal and interlocking system on Union Pacific as better than that on any other Western road. He declared that efficiency has always been the paramount issue in the development of Union Pacific, that efficiency has never been subordinated to economy.

On cross-examination by Mr. Severance, for the government, Mr. Park agreed that at present there are no roads in the country whose condition is comparable to that of the original Union Pacific, which witness described Wednesday in denoting improvements made since.

Between 1885 and the receivership about $4,000,000 were expended on additions and betterments. During the receivership a comparatively small amount was expended on improvements, a fact due largely to the coincident heaviness in the business world generally. Mr. Severance recalled the fact that the Union Pacific receivership was one under which no receivers' certificates were issued.

Witness agreed that the increasing of train load to solve the problem of congestion, in the fall of 1907, was an economic as well as a strategic measure. Mr. Severance asked whether Union Pacific had not put into operation every possible economy during the panic period. Witness stated that considerable economies were effected, but not at the expense of maintenance of the properties in perfectly safe condition.

Mr. Park described the electric staff machines used by Union Pacific over the single track line on the crest of the Rockies, enabling trains to run from Cheyenne to Laramie without train orders. There being no east-bound train on the single track section, a staff is taken by the train crew from the machine at Cheyenne, whereupon the current is broken at the western terminus and no staff can be extracted from the machine until the west-bound train has arrived and the staff has been placed in the machine there. Until recently, when this system was installed at points on the Lehigh Valley, the Union Pacific was the only road on which it was employed.

Witness recalled that as late as 1881 President Clark, on a trial trip to test the air-brake, which failed because not properly operated, declared that the hand-brake was much preferable.

Explaining the fact that despite a reduction of 40 miles on the Council Bluffs to Ogden line since 1900, the schedule of the Overland Limited has for several years been about two and a half hours longer than in 1900, Mr. Park stated that the construction of bridges, ballasting, etc., had retarded trains of this class on an average of three hours for the run to Ogden. The Overland's schedule was reduced Feb. 20, 1910, to 30 hours, 15 minutes Omaha to Ogden. As to the effect of reducing grades, Mr. Park stated that running time was not necessarily reduced thereby, as before the grades were cut helper engines were used.

Witness said that the Union Pacific's system runs no scheduled through freight train east from Portland because of irregularity of the offerings of tonnage. Regarding the 80-hour fruit train schedule from Ogden over Union Pacific, Mr. Park said that he knew of no contract with shippers, and in fact knew that the shippers had endeavored to secure a better schedule.

Mr. Park brought out the fact that the Fast Mail out of Omaha to San Francisco and Portland is the heaviest mail train in the United States. As of Feb. 20, 1910, its schedule, Omaha to Ogden, was 26 hours, 47 minutes.

In connection with the recent reduction in the running time of the Overland Limited Mr. Severance asked whether this was affected by the washout on the San Pedro, compelling the discontinuance of the Los Angeles Limited, whose time between Ogden and Omaha had been three hours less than that of the Overland. Mr. Park answered that he could not say.

Asked whether the fastest time of Union Pacific passenger trains is not slower than that of Eastern lines, Mr. Park said that Union Pacific engines exert fully as much power as the Eastern lines. Supplementing other causes of slowing passenger trains schedules since 1900, Mr. Park stated that in 1907 the number of passenger trains per day over Union Pacific was 7.3, in 1908 was 11.70 and in 1909 was 12.28, denoting a large increase in traffic density.

William David Lincoln, general car agent in charge of transportation and train schedules for Union Pacific, was the next witness produced. Mr. Lincoln recounted the difficulties in moving traffic subsequent to the San Francisco disaster. Cars were used for storage purposes by jobbers, warehouses having been destroyed, until a great blockade of cars was caused, which was not cleaned up for many months, and their return seriously clogged Union Pacific lines. Witness testified that in his judgment the best speed for freight trains between district terminals, at which engines are changed and inspection made, would be about 11 miles an hour. That is, that the 100-hour freight schedule under present conditions as to single track, traffic density, etc., is the best schedule possible.

Asked whether Salt Lake merchants did not receive better service in 1900 than at present, Mr. Lincoln declared that all Salt Lake merchants are receiving better service to-day than in 1900. He said that it was more desirable for the merchant to be able to depend on a regular service, though it be slower, than to have a fast service which he could not depend upon.

Witness stated that schedule freight trains are not held over to make up a load, but that additional sections are necessarily held over for this purpose, although given a reasonable number of cars a train would be run out of Council Bluffs at any time.

On cross-examination by Mr. Severance, Mr. O'Brien testified that he has been connected with the O. R. & N. Co. for 17 years, and its general manager for five years, his connection with the Southern Pacific lines in Oregon dating from 1904.

Mr. O'Brien testified that Harriman forces have been laying track on the Des Chutes river line for the last 60 days. Within 30 days 50 miles of road will be ready for track, which will be laid at once. The witness stated that no track has been laid by the Hill forces or the parallel Oregon Trunk line.

Asked whether it was not the activity on the part of the Hill interests which induced initiation of work on the Des Chutes line, Mr. O'Brien testified that he had had authority from the executive board to build this line, and an appropriation at his disposal, over a year before there was any rumor of Hill intentions on the territory; but that the work was held up by tardiness on the part of the government in approving the maps filed.

Mr. O'Brien declared that there is plenty of room along the Des Chutes for two lines.

Q. "And is there not plenty of business in Central Oregon for two lines?"

A. "No, sir. In my opinion there is not, and for several years will not be better than slim picking for one line, to say nothing of two."

Witness stated that the line from Hillsboro to Tillamook, a timber line from Portland to the Pacific, will be completed by August next. The Oregon Railway & Navigation Company is now running four through passenger trains each way daily, via Huntington, against one train each way in 1900. Witness testified that the through freight train to Portland is scheduled to make the run of about 450 miles from Huntington in 35 hours, a little under 12 miles an hour, including terminal stops. Over the spurs of the Blue mountains about 28 miles of this westward haul necessitated negotiation of a grade of approximately 116 feet to the mile.

Asked how the train could maintain a 12-hour schedule, despite such obstacles, Mr. O'Brien pointed out that Oregon Railway & Navigation traffic density is probably not more than 50 per cent. of that on Union Pacific proper, and that the fast freight business into Portland is expedited by trimming train loads about 25 per cent.

After the noon recess E. E. Calvin, vice-president of the Southern Pacific and general manager of the Pacific system, was put on the stand.

Mr. Calvin testified that shortly after taking charge of the Southern Pacific's Pacific system he had argued against building branches south of the Columbia river further than would care for grain traffic on the plateau. Instead he recommended construction of an east and west line and the Siskiyou cut. When completed the junction with Southern Pacific California main line will be at Black Buttes, some 15 miles south of Weed.

The present line has a maximum grade of 3.3 per cent. in both directions, which will be reduced on the new line northbound to 2.3 per cent. and southbound to 1.5 per cent., the distance also being reduced 15 miles. This will prove an economy in hauling freight. Mr. Calvin also answered, in reply to a query, that only a few miles of the east and west line through Central Oregon had been built.

Thornwell Fay, vice-president and general manager of the Southern Pacific lines east of El Paso, with headquarters at Houston, followed Mr. Calvin. He recounted improvements on the Atlantic system since 1901, including raising of the standard of rail from 75 to 90 pounds, new ballasting, steel bridges, etc., also the new docks at Galveston, on which $2,118,935 has been expended to date.

Mr. Fay testified that in December, 1909, freight moved between New York and El Paso via Galveston in eight days and 22 hours, against nine days and six hours in December, 1900. Between 1902 and 1909, inclusive, fiscal years, the amount expended on improvements and new equipment, charged to capital account, was $12,683,061, against an outlay of $8,766,125 between 1894 and 1901.

From Jan. 1, 1904, to Dec. 31, 1906, when 26,350,990 passengers were carried over 1,658,794,090 passenger miles over the New Orleans to San Francisco lines of the Southern Pacific only one passenger was killed, a remarkable record of safe transportation.

R. B. Miller, general freight agent of the O. R. & N., asked why lower class rates between San Francisco and Portland had been materially increased in 1905, said that the rates had been and still are too low; lower, in fact, for the 756 miles than are the class rates for the 400 miles between Chicago and St. Paul. As to water competition, these rates always have been influ-

enced by the fact that the ocean is there; but while too low for the service performed, they are too high to secure the business from the steamship lines.

Mr. Severance asked how it was that the O. R. & N. and the Oregon Short Line could carry business from Portland to Ogden, destined for Chicago, receiving only 19 cents a hundred as its proportion, if they could not afford to carry Oregon common points business to Utah common points for 25 cents for the haul between Portland and Ogden.

Witness stated that the former business involved no interchange or back haul, but being reminded by Mr. Severance that the Roseville gateway via the Shasta route has been closed to all business for points east of Ogden, originating in the Willamette Valley south of Portland, although this compels a haul north to Portland and then south over the Navigation and Short Line, Mr. Miller said that personally he believed the Shasta-Central Pacific route over the Siskiyous and Sierras is impracticable as compared with the route via Portland, even for business between points south of Portland and those west of Ogden.

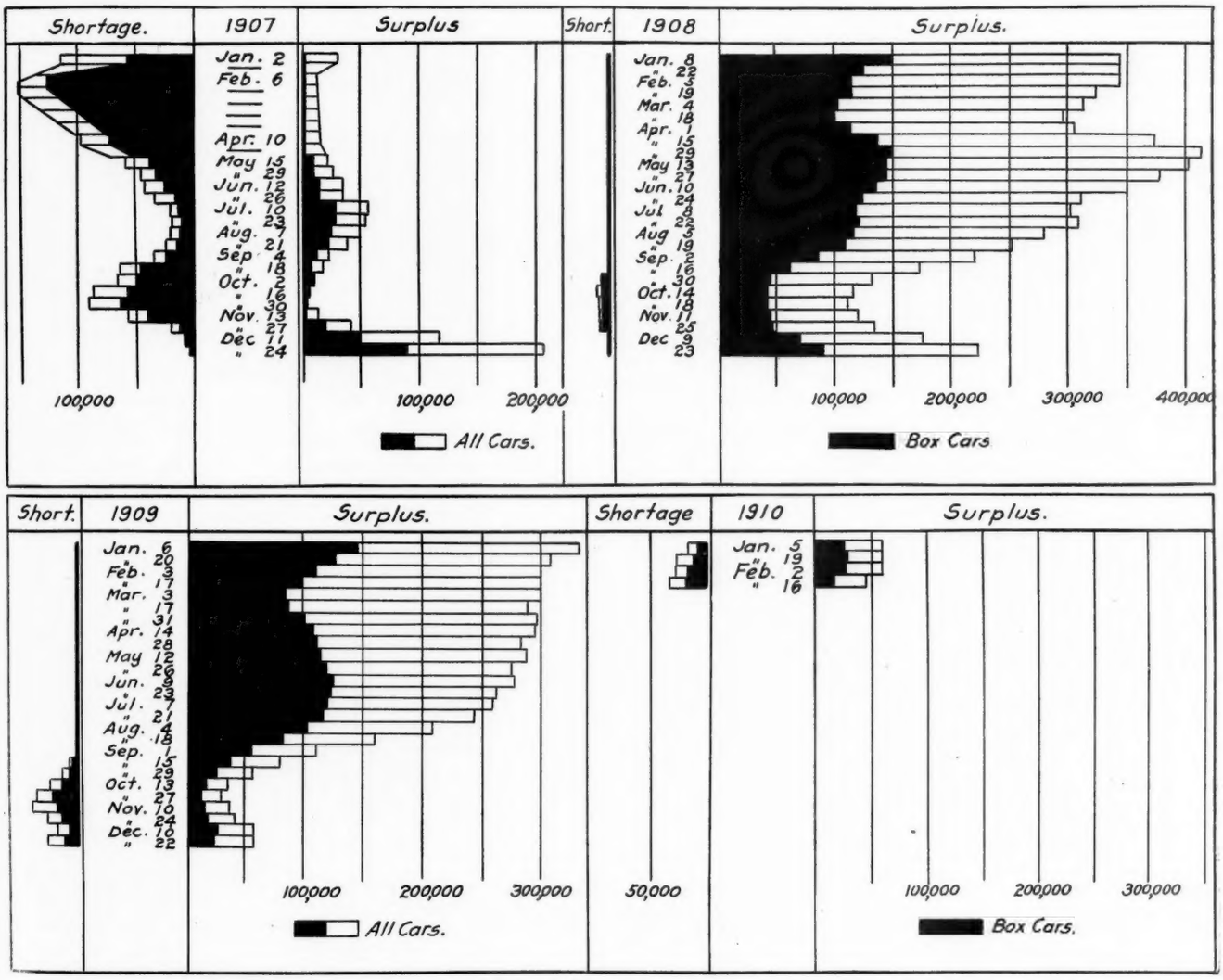
G. W. Luce, general freight agent for the Southern Pacific, at San Francisco, testified that during the time between 1891 and 1894, when he represented the Union Pacific as general agent at San Francisco the Southern Pacific was never considered a factor with regard to San Francisco to Portland business, which went by water as the natural route; there may have been some solicitation of Portland-San Francisco business by Union Pacific freight agents at Portland, but never any at San Francisco. Witness also testified that while he represented Union Pacific it solicited San Francisco-Montana business, and carried the bulk of it, via Ogden and the Short Line, its line being the shortest route between these points.

The Bow River Valley.

The Canadian Pacific during the past three years has sold and colonized over 1,000,000 acres of rich agricultural land in the Bow river valley, Alberta. In order to prove the merit of its farming proposition the road established on this tract a large number of demonstration farms on which were grown every product of the north temperate zone. Over 1,000 miles of irrigation canals have been constructed in this tract of land; one branch line of railway running north from the main line at Langdon is now in operation for about 40 miles and another branch extending east the full length of the 3,000,000-acre project will be built in 1910. This region, recently inhabited only by cattle, antelope and coyotes, is now dotted over with new homes, the purchasers in the Bow river valley being mostly Americans. The company estimates that at least 1,500,000 acres of the 3,000,000-acre tract can be put under irrigation at a total cost of perhaps $9,000,000, and the 3,000 miles of canals, ditches and laterals necessary for the irrigation of the project will be completed by 1915. The thousand miles of canals already built are now in use. The principal products of the Bow river valley tract are winter and spring wheat, oats, barley, flax, timothy, alfalfa, vegetables of all kinds, small fruits and all kinds of forage. Seven new towns have sprung up on the main line east of Calgary as a result of this railway colonization, and over 20 grain elevators are in operation in the district.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in pre-



Car Surpluses and Shortages in 1907, 1908, 1909 and 1910.

senting statistical bulletin No. 65-A, giving a summary of car shortages and surpluses by groups from October 28, 1908, to February 16, 1910, says:

"The bulletin shows a decrease in the surplus of 6,087 cars, with an increased shortage of 4,579 cars. The decrease in surplus is principally in box, while more than half of the increase in shortage is made up of coal cars. The demand for the latter class has been quite active, weather conditions and congestions attributable thereto having retarded the movement to such an extent as to seriously effect the car supply. The principal surplus is still in the West and Northwest, while the eastern, middle and southern territory report the largest shortages."

The accompanying table gives surpluses and shortages by groups for the period covered by the report and the diagrams show total surpluses and shortages bi-weekly in 1907, 1908, 1909 and 1910.

CAR SURPLUSES AND SHORTAGES.

Group*	Date.	Number of roads.	Surpluses. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
1	February 16, 1910	8	31	1,300	511	26	1,868	421	..	..	149	570
2	" 16, 1910	21	236	141	568	528	1,473	510	10	3,970	19	4,509
3	" 16, 1910	22	275	284	640	1,619	2,818	3,777	515	2,336	1,519	8,147
4	" 16, 1910	10	1,373	57	362	372	2,164	2,174	96	3,679	500	6,449
5	" 16, 1910	22	1,296	310	219	592	2,417	2,630	510	768	266	4,174
6	" 16, 1910	17	2,739	814	2,434	3,444	9,431	4,273	23	61	971	5,328
7	" 16, 1910	4	278	152	559	793	1,782	.....	...	...	...	.....
8	" 16, 1910	13	2,030	339	422	1,606	4,397	474	...	21	144	639
9	" 16, 1910	10	1,452	300	122	1,022	2,896	50	40	...	...	90
10	" 16, 1910	16	3,505	1,232	2,736	4,273	11,746	100	49	36	...	185
11	" 16, 1910	5	1,755	1,518	87	1,141	4,521	1,039	...	...	74	1,113
Grand total		148	14,990	6,447	8,660	15,416	45,513	15,448	1,243	10,871	3,642	31,204

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alamaba, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and North and South Dakota lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; and Group 11—Canadian lines.

Bridge Arbitraries at St. Louis.

A committee representing the shoe manufacturers and jobbers of St. Louis has asked the municipal assembly to reject the pending ordinances for the vacation of certain streets which the Terminal Railroad Association of St. Louis desires to occupy, and that a committee of the commercial interests of St. Louis be appointed to confer with the railways with a view to securing the elimination of the arbitraries on freight and passenger traffic across the Mississippi river bridges. The committee, headed by J. C. Johnson, visited Chicago, Davenport, Rock Island, Omaha, Kansas City, the Twin Cities and Cincinnati and studied the conditions at these places. The result of its study was the conclusion that the existing bridge arbitraries at St. Louis are unjust.

These arbitraries apply on traffic originating within a radius of 100 miles of St. Louis. The conditions at the cities mentioned were studied because their situations with reference to rivers are similar to that of St. Louis. Davenport, Ia., and Rock Island, Ill., which are on opposite sides of the Mississippi, have the same merchandise rates to all interior points in both Illinois and Iowa. Minneapolis and St. Paul, which are on opposite sides of the river, also have the same merchandise rates in both directions. They concluded that within a zone of 25 miles St. Louis is at a disadvantage as compared with all the other cities mentioned, except Kansas City, of 1.5 to 12.5 cents per 100 miles; that in a 50-mile zone St. Louis is at a disadvantage as compared with other cities, except Kansas City, of from 1.6 to 13.3 cents, and that in a 100-mile zone St. Louis is at a disadvantage as compared with other cities, except Kansas City, of from 3 to 7.6 cents. It was also found that St. Louis is at a disadvantage as compared with Davenport, Rock Island, Omaha and Cincinnati, while it has an advantage as compared with Kansas City, and has about the same advantages as Minneapolis and St. Paul.

The bridge arbitraries at St. Louis, it is contended, also put that city at a disadvantage as compared with other cities, in rates on coal, the comparison being chiefly with Chicago, to which, however, the average haul of coal is very much longer than to St. Louis. It is shown that the average rate per ton per mile on coal to East St. Louis is 1.2 cents and to St. Louis 1.749 cents, while the average rate to Chicago is 7.69 mills, but the minimum mileage to Chicago is 65 miles, while the average distance to East St. Louis is 26.75 miles and to St. Louis 29.75 miles. The committee contends that the city of St. Louis should deal with the individual railways which own the Terminal Railroad Association, rather than with the association itself. It contends that at present the city is being injured by the rates charged by the Terminal Railroad Association.

INTERSTATE COMMERCE COMMISSION.

Following the decisions in *Rice, Robinson & Witherop v. W. N. Y. & P. R. R. Co.*, 6 I. C. C. Rep., 455, and in *Dallas Freight Bureau v. G., C. & S. F. Ry. Co.*, 12 I. C. C. Rep., 223, the commission declines to now award reparation under a decision formerly rendered in a case in which such reparation was not prayed for. (17 I. C. C., 491.)

Rates of Florida Fruits Unreasonable.

Florida Fruit & Vegetable Shippers' Protective Association v. Atlantic Coast Line et al. Opinion by Commissioner Prouty.

Complainant's allegations in case No. 2566 do not properly notify defendants of the things complained of, and the commission cannot properly undertake to establish rates to the territory not embraced in case No. 1168. In some way the rates to be dealt with by the commission must be definitely specified in the complaint. The thing found fault with should definitely appear.

The present proportional rates from Florida base points on citrus fruits to territory north of the Ohio river, west of the Buffalo-Pittsburgh line and east of the Missouri river are unreasonable, and should not exceed the rates named in the report. The present carload rates from Florida base points on vegetables to Baltimore, Philadelphia, New York and Boston are unreasonable, and should not exceed the rates named in the report.

While the commission takes into account competitive conditions in passing upon the reasonableness of rate adjustments, it does not feel that, in the present instance, it can properly require defendants to maintain rates from Florida base points to Ohio river crossings on vegetables of less than 30 cents per crate, and the commission cannot therefore condemn the advances. Carriers may sometimes do, as a matter of policy, what this commission would not require.

Maximum rates for the transportation of pineapples and citrus fruits from points of production upon the Florida East Coast Railway to Jacksonville when destined for points beyond, in carload and less-than-carload quantities, prescribed. Local rates from Florida base points may properly exceed the proportional rates established by 2 cents per crate in case of vegetables, 3 cents per box in case of citrus fruits and pineapples, and 4 cents per 100 lbs. where the rate is named in that manner.

Mixture of fruits and vegetables from Florida points should be allowed in carloads, but the rate and minimum should be that of the article which takes the highest rate. This gives to the carrier the earnings which it should make on an entire carload of that commodity, and permits the vegetables to be handled in the most economical manner. (17 I. C. C., 552.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF DECEMBER, 1909.

(See also issues of February 4, 11, 18 and 25.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Atlantic & St. Lawrence	167	$116,611	$22,818	$150,392	$18,523	$12,967	$4,300	$66,439	$4,596	$106,824	$43,568	.....	$6,436	$37,132	—$7,471
Atlantic City	167	49,615	34,628	89,111	25,539	14,292	901	58,711	602	100,045	—10,934	—$3,491	7,000	—21,425	—4,978
Belt Ry. Co. of Chicago	21	.....	.....	144,533	12,861	21,151	616	87,522	5,515	127,665	16,868	.....	5,000	11,868	—54,969
Butte, Anaconda & Pacific	46	82,224	6,082	94,319	8,423	20,319	574	43,404	2,092	74,812	19,508	.....	2,318	17,189	—14,879
Carolina, Clinchfield & Ohio	225*	71,665	10,300	84,066	10,983	12,163	5,636	22,821	7,777	59,380	24,686	.....	4,000	20,686	21,178
Central Vermont	411	198,190	65,398	284,953	20,089	129,208	7,994	125,238	8,992	291,521	—6,567	485	10,117	—16,199	—34,486
Chicago Terminal Transfer	90	.....	1,894	105,809	18,194	25,604	349	51,830	5,435	101,412	4,397	742	10,055	—4,916	3,456
Cincinnati Northern	248	75,262	16,117	95,897	10,043	15,590	2,657	35,088	2,707	66,085	29,812	.....	4,500	25,312	30,246
Cleveland, Akron & Columbus	210	147,363	39,480	201,397	26,334	74,487	3,089	67,739	3,607	175,256	26,141	.....	6,041	20,100	—31,540
Cleveland Terminal & Valley	93	65,881	14,042	100,684	7,949	13,050	1,571	57,613	1,498	81,681	19,003	.....	3,403	15,600	—6,884
Detroit, Grand Haven & Milwaukee	190	106,617	39,521	173,041	15,251	22,857	5,390	72,730	1,410	117,638	55,403	—45	2,727	52,631	27,928
Eastern Ry. Co. of New Mexico	227	40,757	32,504	77,422	19,649	13,232	1,066	21,764	2,575	58,286	19,136	.....	3,376	15,760	—10,345
Grand Trunk Western	336	327,003	146,678	507,156	45,087	70,707	16,583	202,117	6,219	340,713	166,443	—1,232	29,190	136,021	—3,955
Houston, East and West Texas	191	81,211	31,981	119,152	21,688	9,358	2,485	37,607	3,272	74,410	44,742	.....	2,280	42,462	—7,090
Indiana Harbor Belt	105	.....	.....	157,039	39,962	20,442	1,745	97,727	4,540	164,416	—7,377	—3,907	5,159	—16,443	—20,745
Lehigh & Hudson River	96	118,151	3,480	122,775	10,021	13,763	1,079	50,497	4,751	80,111	42,664	.....	2,750	39,914	—25,320
Louisville, Henderson & St. Louis	218	57,906	33,617	97,789	14,724	9,037	3,563	32,648	3,115	63,087	34,702	230	2,500	32,432	—1,887
Michigan Central	1,746	1,560,890	540,358	2,345,051	266,431	339,360	74,589	950,455	46,727	1,677,562	667,489	566	84,532	583,523	66,016
Minneapolis, St. Paul & S. S. Marie	2,495†	727,209	233,446	1,025,377	85,200	117,318	16,976	361,373	17,493	598,360	427,017	—1,704	52,225	373,088	73,646
Nevada Northern	165	98,460	15,644	118,411	4,884	11,031	247	27,674	3,945	47,781	70,630	.....	3,254	67,376	1,266
New York, Philadelphia & Norfolk	112	204,904	32,201	255,062	26,419	52,189	4,435	94,925	10,312	188,280	66,782	.....	6,250	60,532	6,968
Pecos & Northern Texas	152	79,004	20,065	104,689	26,176	17,987	1,924	36,826	4,147	87,060	17,629	.....	3,980	13,649	—5,298
Richmond, Fredericksburg & Potomac	83	100,673	64,678	188,882	23,351	29,395	2,193	64,447	4,918	124,304	64,578	.....	200	64,378	20,227
St. Louis Merchants Bridge Terminal	9	.....	6,365	156,978	17,452	3,814	384	68,524	4,683	94,857	62,121	.....	5,545	56,576	19,798
Southern Kansas Ry. of Texas	125	104,365	17,821	126,248	15,177	22,211	2,021	41,794	3,976	85,180	41,068	.....	2,406	38,662	30,995
Southern Ry. Co. in Mississippi	280‡	62,278	43,210	112,828	19,239	5,757	3,156	35,813	3,949	67,914	44,914	.....	4,259	40,655	.....
Spokane & Inland Empire	168	36,784	42,693	84,737	9,806	6,493	1,820	27,874	7,721	53,714	31,023	6,947	2,700	35,270	7,716
Spokane International	141	69,260	17,307	88,437	7,258	4,149	1,931	24,489	2,494	40,321	48,116	.....	2,294	45,822	25,130
Terminal R.R. Ass'n of St. Louis	34	.....	272	226,075	22,981	18,320	591	82,432	5,738	130,062	96,013	15,469	26,113	85,369	—11,513
Ulster & Delaware	129	50,849	14,405	69,005	7,664	14,649	923	32,547	2,622	58,405	10,600	216	3,200	7,616	1,731
Union R. R. Co. of Baltimore	9	102,994	18,829	124,317	7,821	.....	618	5,225	1,988	15,652	108,665	.....	4,465	104,200	27,816
Virginia & Southwestern	188	78,389	12,186	94,383	12,194	21,198	1,291	31,832	3,660	70,175	24,208	.....	4,400	19,808	—5,630
Virginian	444§	137,442	19,126	162,137	20,514	28,878	6,004	50,610	7,388	113,394	48,743	434	13,667	35,510	.....
Washington Southern	35	33,310	31,355	85,762	7,763	9,329	964	32,951	2,375	53,382	32,380	.....	2,345	30,035	—382
West Jersey & Seashore	356	126,145	163,745	315,122	90,177	58,019	11,227	184,696	8,993	353,112	—37,990	—350	20,037	—58,377	—44,575
Wisconsin Central	1,030	416,163	110,842	568,845	105,789	93,299	21,057	235,448	14,749	470,342	98,503	448	28,837	70,114	—50,430
SIX MONTHS OF FISCAL YEAR.															
Atlantic & St. Lawrence	167	$455,314	$181,772	$693,946	$217,257	$73,112	$18,411	$210,609	$17,589	$536,978	$156,968	.....	$38,613	$118,355	$37,416
Atlantic City	167	371,700	660,463	1,078,036	161,013	86,464	14,969	477,496	6,739	746,681	331,355	—$21,630	42,000	267,725	61,696
Belt Ry. Co. of Chicago	21	.....	.....	1,119,770	81,969	145,833	3,300	438,435	37,523	707,060	412,710	.....	30,000	382,710	—9,350
Butte, Anaconda & Pacific	46	530,486	57,743	622,989	61,484	122,002	3,060	241,973	12,415	440,934	182,055	.....	12,919	169,136	—39,646
Carolina, Clinchfield & Ohio	225*	398,017	74,617	488,097	64,372	81,092	28,572	113,508	37,241	324,786	163,312	.....	19,500	143,812	141,390
Central Vermont	411	1,239,946	607,236	1,978,565	237,558	373,589	49,964	762,291	43,294	1,466,696	511,869	5,683	60,700	456,852	168,270
Chicago Terminal Transfer	90	.....	14,267	620,535	90,913	151,328	3,432	283,917	29,994	559,584	60,951	5,205	100,330	—34,173	—3,222
Cincinnati Northern	248	499,621	122,610	653,060	91,003	114,616	17,520	218,973	16,002	458,114	194,946	.....	25,001	169,945	118,317
Cleveland, Akron & Columbus	210	914,985	278,427	1,275,213	179,722	325,055	17,868	399,320	22,248	944,213	331,000	.....	31,042	299,958	—28,012
Cleveland Terminal & Valley	93	449,397	95,948	652,832	90,023	78,358	9,566	260,337	11,272	449,556	203,276	.....	20,419	182,857	16,881
Detroit, Grand Haven & Milwaukee	190	608,691	325,075	1,070,561	147,441	141,413	34,777	402,893	33,279	759,803	310,758	137	16,363	294,532	68,499
Eastern Ry. Co. of New Mexico	227	279,367	211,260	519,226	111,655	59,252	5,615	131,656	14,630	322,808	196,418	.....	20,675	175,743	—21,424
Grand Trunk Western	336	1,902,938	1,000,550	3,100,873	368,638	435,938	130,841	1,095,792	76,000	2,107,209	993,664	—3,861	175,140	814,663	28,363
Houston, East and West Texas	191	458,189	175,308	668,904	117,955	48,905	10,664	212,070	20,200	409,794	259,110	.....	10,464	248,646	7,013
Indiana Harbor Belt	105	.....	.....	984,276	207,362	114,221	9,837	493,726	27,778	852,924	131,352	—10,244	22,459	98,649	84,421
Lehigh & Hudson River	96	695,745	24,661	730,349	108,085	75,672	6,669	243,487	21,868	455,781	274,568	.....	16,425	258,143	119,917
Louisville, Henderson & St. Louis	218	341,808	218,098	594,706	146,394	48,492	21,777	182,083	18,112	416,858	177,848	2,132	15,000	164,980	4,776
Michigan Central	1,746	9,663,767	3,814,095	14,825,098	1,977,068	1,869,998	412,536	5,091,194	243,398	9,594,194	5,230,904	—10,625	557,532	4,662,747	1,088,166
Minneapolis, St. Paul & S. S. Marie	2,495†	5,972,792	1,992,805	8,375,219	711,964	761,681	142,511	2,217,959	132,845	3,966,960	4,408,259	107,960	484,929	4,031,290	1,129,254
Nevada Northern	165	622,695	91,561	738,506	38,156	64,261	1,964	141,576	20,596	266,553	471,953	.....	18,136	453,817	156,228
New York, Philadelphia & Norfolk	112	1,347,692	214,711	1,675,069	156,197	281,765	21,096	578,245	53,273	1,090,576	584,493	.....	37,500	546,993	126,711
Pecos & Northern Texas	152	648,737	140,621	820,142	134,098	108,605	10,241	227,054	23,712	503,710	316,432	.....	10,482	305,950	89,567
Richmond, Fredericksburg & Potomac	83	563,022	336,771	1,019,038	176,981	129,529	14,500	338,510	27,886	686,506	332,532	.....	1,200	331,332	63,016
St. Louis Merchants Bridge Terminal	9	.....	30,978	873,242	135,807	23,452	4,370	329,294	28,731	521,654	351,588	.....	28,545	323,043	100,805
Southern Kansas Ry. of Texas	125	673,762	123,367	818,122	97,765	127,069	10,720	249,332	21,739	506,625	311,497	.....	10,827	300,670	183,742
Southern Ry. Co. in Mississippi	280‡	293,090	180,641	512,820	115,719	34,644	14,735	195,664	20,453	381,215	131,605	.....	27,550	104,055	.....
Spokane & Inland Empire	168	252,722	436,232	724,889	68,722	37,704	12,515	172,128	41,554	332,634	392,255	93,756	16,200	469,811	247,006
Spokane International	141	318,322	137,481	468,798	63,118	26,427	11,492	131,714	15,475	248,226	220,572	.....	13,427	207,145	82,300
Terminal R.R. Ass'n of St. Louis	34	.....	1,500	1,373,682	207,398	90,958	6,239	427,989	35,131	767,715	605,967	86,789	132,113	560,643	—1,885
Ulster & Delaware	129	377,883	239,778	644,563	77,153	69,414	7,707	235,902	14,644	404,820	239,743	762	19,200	221,305	44,078
Union R. R. Co. of Baltimore	9	591,000	116,475	718,435	76,685	.....	3,087	29,575	11,444	120,791	597,644	.....	26,792	570,852	105,916
Virginia & Southwestern	188	524,417	72,627	616,589	88,964	118,350	8,349	177,310	20,361	413,334	203,255	.....	23,900	179,355	—44,388
Virginian	444§	758,860	110,349	913,290	156,627	165,487	35,509	264,157	43,987	665,767	247,424	2,923	66,667	183,679	.....
Washington Southern	35	196,558	168,376	480,031	47,457	54,218	6,213	172,443	12,728	293,057	186,974	.....	14,069	172,905	30,618
West Jersey & Seashore	356	864,326	2,095,551	3,168,294	479,358	348,043	92,206	1,188,713	51,473	2,159,793	1,008,501	16,328	120,223	904,606	94,730
Wisconsin Central	1,030	3,149,102	839,105	4,244,334	562,630	582,187	137,104	1,412,262	98,042	2,792,225	1,452,109	4,789	173,482	1,283,416	72,454

* Mileage operated December 31, 1908, 107. † Mileage operated December 31, 1908, 2,395. ‡ Figures included in Southern Ry. prior to January 1, 1908. § Mileage operated December 31, 1908, 204, under construction. — Indicates Deficits, Losses and Decreases.

Discrimination Against Montgomery.

Montgomery Freight Bureau v. Louisville & Nashville et al. Opinion by Commissioner Clark.

Complaint alleges that the adjustment of rates from and through the Ohio and Mississippi river crossings is unjustly discriminatory against Montgomery, Ala., and unduly preferential to Pensacola, Fla., and Mobile and Birmingham, Ala.; held, that it is not unlawful for defendants to maintain lower rates from said river crossings to Pensacola and Mobile than to Montgomery, but that no rate from or through said river crossings to Montgomery may lawfully exceed the combination on Mobile; and held further, that circumstances and conditions do not warrant establishing at Montgomery the same rates that apply to Birmingham. (17 I. C. C., 521.)

Lower Rates Ordered on Powder.

E. I. Du Pont de Nemours Powder Co. v. Pennsylvania Railroad et al. Opinion by Chairman Knapp.

Complainant is subjected to undue prejudice and disadvantage in the transportation of common black powder from Montchanin, Del., through Chadd's Ford Junction to points local to the Pennsylvania Railroad in Pennsylvania and to certain points in Ohio local to the Pennsylvania Company. For the future the rates from Montchanin to such points should not exceed the rates contemporaneously in effect from Philadelphia rate basis territory to the same points. (17 I. C. C., 544.)

STATE COMMISSIONS.

The railway commission of Nevada has ordered extensive reductions in freight rates on the Southern Pacific. The order does not go into effect for at least 30 days, and there is talk that the railway will resist the order.

John A. Talty, road foreman of engines of the Delaware, Lackawanna & Western, has been appointed assistant supervisor of equipment, at a salary of $2,400 per year, of the New York Up-State Public Service Commission. He began railway work as a freight brakeman, later becoming locomotive engineman, air-brake inspector and then road foreman of engines.

The Illinois Railway Commission has rendered a decision in which it holds that the railways must so route freight that it will be handled with the least possible cost to the shipper. The decision was rendered in a proceeding brought by Bregman & Company against the Chicago & North Western for the collection of alleged excessive freight charges. This company billed a car of scrap iron from Evanston to Kewanee. It was sent by the way of Sterling and the charge was $1.40 per ton. The concern said it directed the car to be sent by the way of Chicago and via the Burlington road, which would have made the rate 95 cents.

The New York State Public Service Commission, Second district, having made some investigation of street railway conditions in Rochester, and making recommendations to the railway company and to the mayor, goes into details in the following thorough-going fashion, the recommendation being directed to the single object of relieving congestion of cars on Main street during the evening rush hours: Cars to stop on the far side instead of the near side of transverse streets; adopt a certain specified roundabout route for interurban cars so as to relieve Main street; put in crossover tracks so as to turn back certain cars during the rush hours; employ six additional inspectors on Main street; adopt detailed rules for the government of motormen, conductors and inspectors; have an emergency wagon at a convenient point during the rush hours; all of these changes to become effective within five days. The commission suggests to the mayor that the city should clear off snow and slush so that passengers can get on and off cars in comfort and convenience.

COURT NEWS.

At Cincinnati on Monday of this week in the United States district court the Lake Shore & Michigan Southern was fined $1,000 for violation of the rate law in connection with a shipment of railway ties from Ozone, Tenn., to Bryan, Ohio.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Hale Holden, general attorney of the Chicago, Burlington & Quincy at Chicago, has been appointed assistant to the president, with office at Chicago.

O. M. Colston has been appointed assistant to the vice-president of the Fort Worth & Denver City and the Wichita Valley, with office at Fort Worth, Tex.

L. F. Linney has been appointed auditor of the Arkansas, Louisiana & Gulf, with office at Hamburg, Ark., succeeding L. E. Smart, resigned, to go to the Chicago Glossit Co.

Andrew M. Moreland and W. B. Trowbridge have been appointed receivers for the Delaware & Eastern Railroad Co. and the Delaware & Eastern Railway Co., with offices at New York.

The following officers of the Southern Indiana and the Chicago Southern have been elected: President, E. K. Boisot; treasurer, F. O. Wetmore; secretary, E. M. Tourtelot, all with office at Chicago.

Richard A. Jackson, formerly vice-chairman of the executive committee and general counsel of the Chicago, Rock Island & Pacific, has been appointed general counsel of the Great Northern, with office at St. Paul, Minn., succeeding W. R. Begg, resigned some months ago. A photograph of Mr. Jackson and a sketch of his railway career were published in the *Railway Age Gazette* of December 10, 1909, page 1165.

Operating Officers.

W. D. Perkins has been appointed a trainmaster of the Southern Pacific, with office at Sacramento, Cal.

C. L. Pratt has been appointed superintendent of dining and sleeping cars on the Great Northern, with office at St. Paul, Minn., succeeding W. O. Chase.

F. C. Coulter has been appointed trainmaster of the Pittsburgh division of the Pennsylvania Lines West, with office at Pittsburgh, Pa., succeeding J. C. McCullough, promoted.

T. Walsh has been appointed an assistant superintendent of the Washington division of the Oregon Railroad & Navigation Co., with office at Spokane, Wash., succeeding H. L. Buchanan, resigned.

F. M. Falck, division engineer of the Philadelphia & Reading, at Reading, Pa., has been appointed assistant superintendent of the Philadelphia & Reading and subsidiary companies, with office at Reading.

J. A. Gordon, formerly general superintendent of the Cincinnati, Hamilton & Dayton, at Cincinnati, Ohio, has been appointed superintendent Southern district of the Chicago Great Western, with office at Des Moines, Iowa, succeeding L. M. Shipley, resigned.

W. H. DeWitt, superintendent of the Missouri & North Arkansas at Leslie, Ark., has been appointed trainmaster of the Hoisington district of the Missouri Pacific, with office at Hoisington, Kan., succeeding R. W. Edwards, resigned to accept service elsewhere.

J. T. Carey, superintendent of the Shenandoah division of the Norfolk & Western, at Roanoke, Va., has been transferred to the Scioto division, with office at Portsmouth, Ohio, succeeding E. A. Blake, who in turn is transferred to the Shenandoah division, with office at Roanoke, succeeding J. T. Carey.

The statement made in these columns on February 18, page 376, that G. Radetzki, general superintendent of the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport, with office at Houston, Tex., has resigned to engage in other business, is erroneous.

Henry J. Curry, day chief despatcher of the Boston & Albany, at Boston, Mass., has been appointed a trainmaster, with office at Beacon Park, with supervision over that part of the Boston division east of Worcester, including branches. Frederick F. Williams, acting night chief despatcher, succeeds Mr. Curry, with office at Boston, and George A. Church succeeds Mr. Williams.

Traffic Officers.

W. T. Billings has been appointed an industrial agent of the Maine Central, with office at Portland, Maine.

B. W. Taylor, superintendent of the Pennsylvania Lines West at Louisville, Ky., has been appointed a general agent, with office at Pittsburgh, Pa.

W. I. Laird, general agent of the Chicago Great Western at Pittsburg, Pa., has been appointed general agent of the St. Joseph & Grand Island, with office at Chicago.

J. T. Crawford has been appointed a traveling passenger agent of the Chicago, Rock Island & Pacific, with office at Peoria, Ill., succeeding C. C. Anderson, promoted.

O. F. Townsend, traveling freight agent of the Chicago, Milwaukee & St. Paul, at Pittsburgh, Pa., has been appointed assistant general freight agent of the Chicago Great Western, with office at Pittsburgh.

I. M. Griffin, general cotton agent of the International & Great Northern, at Palestine, Tex., has been appointed division freight agent, with office at Fort Worth, Tex. He will continue as general cotton agent in charge of solicitation of cotton and cotton seed products.

A. G. Little, traveling freight and passenger agent of the Union Pacific at Kansas City, Mo., has been appointed division freight and passenger agent of the Southern Pacific, with office at Lake Charles, La. Julian Nance, traveling freight agent at Kansas City, succeeds Mr. Little, and W. W. Johnson, soliciting freight agent at Kansas City, succeeds Mr. Nance.

F. C. Fletcher has been appointed general live stock agent of the Missouri Pacific-Iron Mountain system, with office at Kansas City, Mo., succeeding James L. Harris, resigned to engage in other business. R. R. Trimble has been appointed a commercial freight agent, with office at Joplin, Mo., succeeding O. M. Odell, resigned to engage in other business.

Engineering and Rolling Stock Officers.

F. H. Neward, master mechanic of the Pontiac, Oxford & Northern (Grand Trunk), with office at Pontiac, Mich., has resigned.

F. E. Whitcomb has been appointed engineer maintenance of signals of the Boston & Albany, with office at Boston, Mass., succeeding J. M. Fitzgerald, promoted.

Louis Yager has been appointed division engineer of the Northern Pacific, in charge of engineering matters on the lines east of Mandan, N. Dak., with office at St. Paul, Minn.

G. M. Ball, Jr., supervisor of Division No. 9 of the Pennsylvania Railroad, has been transfered to Division No. 7, on the Middle division, with office at Huntingdon, Pa., succeeding M. I. Ward, deceased. J. O. Heap succeeds Mr. Ball, with office at Haddonfield, N. J.

J. M. Fitzgerald, engineer maintenance of signals of the Boston & Albany, at Boston, Mass., has been appointed assistant signal engineer of the New York Central & Hudson River and the Boston & Albany, with office at Albany, N. Y., succeeding W. A. Peddle, resigned to go to another company.

Lewis Kingman, assistant chief engineer of the National Railways of Mexico, the Mexican International and the Interoceanic at Mexico City, Mex., has been appointed engineer maintenance of way, with office at Buenavista, succeeding C. G. Delo, resigned. H. B. Reese, division engineer at Chihuahua, succeeds Mr. Kingman, with office at Mexico City.

OBITUARY.

William E. Dunn, paymaster of the St. Louis & San Francisco, died in St. Louis, Mo., on February 24. Mr. Dunn was born in 1858 and began railway work in 1879 as clerk to the general manager on the Kansas City, Fort Scott & Gulf, and was later with the Kansas City, St. Joseph & Council Bluffs, also the Atchison & Nebraska and the Kansas City, Laurence & Southern. From 1888 to 1897 he was clerk in the office of the president and general manager of the Kansas City, Fort Scott & Memphis, the Kansas City, Memphis & Birmingham, the Kansas City, Clinton & Springfield and the Current River Railroad, and in 1897 was made cashier and paymaster of these companies. He was appointed paymaster of the St. Louis & San Francisco in 1901.

Late News.

The items in this column were received after the classified departments were closed.

The Chicago, Milwaukee & Gary has ordered from the American Car & Foundry Co. six cabooses.

The Waterloo, Cedar Falls & Northern has ordered six electric cars from the McGuim-Cummings Mfg. Co.

The St. Louis, Brownsville & Mexico has ordered from the American Car & Foundry Co. four coaches, three passenger and mail cars, two baggage cars and six cabooses. The company expect to order soon 100 steel underframe box cars.

Bids are wanted up to April 15 by C. N. Coburn, chief engineer, Sault Ste. Marie, Ont., for the clearing, grading and bridge work on a 31-mile section of the Algoma Central & Hudson Bay, between Hawk Lake junction, Ont., and Hobon, on the Canadian Pacific.

Officers of the American Railway Engineering & Maintenance of Way Association have assurances that President Taft will address the convention at Chicago March 17 (Thursday). The President will speak at the hall in Congress Hotel some time between 2 and 4 o'clock.

The Governor of Maryland has signed the bill recently introduced in the Maryland legislature to authorize the Western Maryland Railroad to issue the balance of its unissued stock, amounting to approximately $26,000,000, below par, for the purpose of constructing the new extension from New Haven, Pa., to Connellsville.

A contract has been given to the Engineering Construction & Securities Co. to build an extension of the Atlantic Northern & Southern. The company plans to have the shortest line between Sioux City, Iowa, and St. Joseph, Mo. The first section of 17 miles is now in operation. The next section of 38 miles on the south connecting with the Burlington at Villisca, Iowa, will cost about $500,000 to build.

The opposition of the grain interests of Chicago to the new uniform demurrage code promulgated by the National Association of Railway Commissioners and recently adopted without change by the roads entering Chicago, has resulted in an injunction granted by Judge C. C. Kohlsaat, of the United States Circuit Court, restraining every Chicago road doing an interstate business from putting in effect the new schedule of free time allowances giving grain dealers less time to unload cars. The board of trade and a number of grain firms are the complainants. The court ordered a hearing March 15.

Disastrous Avalanche Near Cascade Tunnel.

Press despatches from Everett, Wash., on Wednesday of this week report the wrecking of two passenger trains of the Great Northern, which were standing near the station at Wellington, Wash., the west portal of the Cascade tunnel, in a disaster which will result in the loss of probably 60 lives. In addition to the dead, it is said that 20 or more persons were injured.

It appears that, in consequence of unusually warm weather and severe floods, a number of trains had been blockaded at Wellington, and that the whole of the trains at this point were swept into a canyon 150 ft. below the level of the track. The business car of Superintendent J. H. O'Neill was attached to one of the trains wrecked, and three men in this car are reported among the killed: A. R. Blackburn, trainmaster; A. E. Longcoy, secretary to the superintendent, and Louis Walker, cook. The road is so seriously blocked that relief parties from division headquarters were expected to reach the scene of the wreck only by going on foot. There was a snow slide also at Drury, on the eastern side of the mountain, which destroyed the station and killed a watchman. Rescue parties are in constant peril from snow slides.

Press despatches from San Francisco, Ogden and other places indicate that the Northern Pacific and the Ogden-Oakland route of the Southern Pacific are also blockaded by floods or snow slides. Many Southern Pacific trains are at a standstill in northeastern Nevada.

Railway Construction.

New Incorporations, Surveys, Etc.

Abilene Central.—It is said that bids for building this line will be asked for at once. The projected route is from Abilene, Tex., southeast to Waco, 150 miles. D. T. Bomar, Fort Worth; M. Jones, H. James and W. G. Swenson, Abilene, are interested. (Jan. 14, p. 118.)

Arizona & Colorado.—See Southern Pacific.

Arizona & Swansea.—This road has been finished from Bouse, Ariz., northeasterly to Swansea, 22 miles. (Nov. 19, p. 989.)

Arizona Eastern.—See Southern Pacific.

Bartlett-Florence.—According to press reports this road was opened March 1 on a section of 11 miles from Bartlett, Tex. The company is building about 84 miles to complete a line from Lampasas, southeast to Milano, with a branch from a point on the main line near the eastern end southeast to Rockdale. G. W. Hubbard, president, Bartlett.

Canadian Northern.—The railway committee of the Canadian House of Commons has agreed to the construction of new lines by the Canadian Northern, as follows:

From a point at or near Dundee, Man., northerly and easterly to a point on the Winnipeg river in or near township 18, range 10, east of the principal meridian.

From a point at or near Portage la Prairie, Man., southeasterly to a point on its line near Ridgeville, in or near township five, range seven, w2.

From a point at or near Moose Jaw, Sask., southeast on the west side of Mocse Jaw creek and the Souris river, to a point in or near township two, thence easterly to a point at or near Bienfait, with a branch from a point near Estevan to Roche Percee in township one, range six, w2.

From a point on the Qu' Appelle, Long Lake & Saskatchewan line of the Canadian Northern between Davidson, Sask., and Disley, westerly and northwesterly to the Saskatoon-Calgary line in township 30, range 14, w3.

From a point on the main line at or near Lashburn, Sask., in township 48, range 23, w3, thence in a generally westerly and northwesterly direction to a point on its authorized line between Edmonton, Alb., and Camrose, in or near township 50, range 22, west of the fourth meridian.

From a point on the Saskatoon-Calgary line, in or near township 28, range 6, w4, northwesterly to a point near Rocky Mountain House, Alb., on the North Saskatchewan river.

From a point on the Saskatoon-Calgary line at or near the crossing of the Red Deer river, in or near township 28, range 19, w4, northwesterly, passing through or near Innisfail, Alb., and Rocky Mountain House to the head waters of the Brazeau and McLeod rivers, and then to a point on its authorized line at or near Yellowhead Pass.

From a point on the existing line near Winnipegosis, Man., southeasterly to a point on the line near the south end of Lake Manitoba.

From a point on the authorized line between Prince Albert, Sask., and Battleford, in or near township 49, range 31, w3, northwesterly to a point near the Slave Lake.

From a point on the authorized line east of Lake Manitoba, Man., westerly via The Narrows to a point on the existing line between Grandview and Roblin.

An officer is quoted as saying that the plans call for building 600 miles of new track during 1910. The line from Edmonton, Alb., west to Vancouver, 800 miles, will be started at once. Work will be begun at both ends simultaneously, and it is hoped that the line will be completed before 1915. The line is to have lower gradients than any other railway and will be free from the danger of snowslides. Only a small amount of actual construction on the Pacific coast line, it is expected, will be done this year, as the time will be fully taken up with the locating. (Feb. 18, p. 384.)

Canadian Pacific.—An officer writes that bids are to be asked for soon to build extensions during 1910 as follows: Outlook, Sask., northwest to Macklin, 147.7 miles. This work involves the crossing of the Saskatchewan river at Outlook on a steel viaduct approximately 3,000 ft. long. Maximum grades will be 0.4 per cent., maximum curvature 6 degs.

From Regina, on the main line, southeast to Griffin, on the Stoughton-Weyburn line, 79 miles. Maximum grades will be 0.4 per cent., maximum curvature 4 degs.

From Craven, connecting the section of the Regina-Bulyea line, already built, with Colonsay, on the Lanigan section, 110.3 miles. Maximum grades will be 0.4 per cent. and maximum curvature 6 degs.

A continuation of the 26-mile line already built from Weyburn, Sask., west towards Lethbridge from Forward, west for 25 miles. Maximum grades will be 0.4 per cent. and maximum curvature 4 degs.

From Kipp, Alb., northwest, mile 28 to mile 58, 30 miles. This is a continuation of the branch built last year from Kipp northwest. Maximum grades will be 0.5 per cent. and maximum curvature 6 degs.

From Tilston, Man., west for 24 miles. This is a continuation of the branch built two years ago from Lauder, Man., on the Estevan section, west. Maximum grades will be 0.4 per cent. and maximum curvature 6 degs.

Second-track is to be laid from Winnipeg west to Portage la Prairie, a part of the Brandon section, 55.6 miles. (Feb. 25, p. 428.)

Chambersburg, Green Castle & Waynesboro (Electric).—This company is said to be planning to build extensions as follows: From Pen Mar, Pa., southeast to Highfield, Md.; from Greencastle, Pa., west to Mercersburg, and from Chambersburg northeast to Shippensburg. (April 9, p. 820.)

Chicago, Rock Island & Pacific.—According to press reports this company has appropriated $4,000,000 for reconstructing and shortening its road between St. Louis, Mo., and Kansas City, 297 miles. (Feb. 25, p. 428.)

Colorado & Southern.—See Denver & Rio Grande.

Denver & Rio Grande.—According to press reports this company and the Colorado & Southern will build jointly a new line connecting Pueblo, Colo., and Walsenburg, 56 miles. The new line is to be built several miles to the eastward of the present Denver & Rio Grande line for most of the way, and will have easier grades than the existing road. It is estimated that it will cost about $45,000 to build the line.

Denver, Northwestern & Pacific.—This company does not contemplate building an extension of the road beyond Steamboat Springs, Colo., which is 214 miles west of Denver, in the immediate future. No branch lines are being built by the company, although private interests are constructing short spurs into the mining and lumber sections, through which the road passes. The company was organized to build from Denver, Colo., west to Salt Lake City, Utah, 490 miles. (March 19, p. 653.)

Enid, Ochiltree & Western.—According to press reports this company, building from Dalhart, Tex., east to Ochiltree, 112 miles, has amended its charter authorizing it to build an additional 55 miles from Ochiltree east to the Oklahoma state line. The plans call for a further extension east to Enid, Okla., about 120 miles. (Dec. 17, p. 1213.)

Grand Trunk.—Announcement has been made that 100-lb. rail has been laid on 200 miles between Montreal, Que., and Napanee, Ont., and contracts have been given for 100-lb. rail for the section between Napanee and Toronto, 133 miles. The company intends ultimately to lay 100-lb. rail on the entire line from Montreal to Chicago.

Grand Trunk Pacific.—According to press reports a contract for building the remaining 135 miles of the Tofield-Calgary branch has been let to the J. D. McArthur Co., Ltd., Winnipeg, Man. This company already has a contract for work on this line. It is expected that the entire line will be finished during the summer of 1910. The section from Tofield, Alb., south to Camrose, 40 miles, was recently finished. Foley, Welch & Stewart were the contractors on this section. (Feb. 18, p. 379.)

Kentucky Highlands.—See Louisville & Nashville.

Lehigh Valley Traction.—Plans are said to have been made by this company for improvements, including extensions and a number of new bridges. It is probable that a new line will

be built from Hellertown, Pa., south to Quakertown, to connect two sections of this road.

LONG ISLAND.—The plans submitted for rebuilding the station at Jamaica, N. Y., and increasing the track facilities on that part of the road call for an expenditure of about $3,000,000. The improvements include the elimination of a number of grade crossings in Jamaica. The company is now carrying out grade crossing removal work between Jamaica and Long Island City. On this part of the work the city has been asked to pay $600,000 towards the cost of these improvements. (Nov. 19, p. 991.)

LOUISVILLE & NASHVILLE.—Bids, it is said, are being asked for building an extension of 9.5 miles on the Kentucky Highlands, from the present southern terminus, southeast, to complete the line to Versailles, Ky. It is expected to have the work finished by September. (See Kentucky Highlands, Dec. 3, p. 1107.)

MEXICAN ROADS.—According to press reports from Monclova, Mex., a contract has been let for building a line between Monclova, Coahuila and Chihuahua, 410 miles, and work is to be started as soon as the necessary equipment and the laborers can be obtained. The new line will reach extensive coal fields, 120 miles west of Monclova, the entire output of which, it is said, has been contracted for by the Monterey Iron & Steel Co. Miguel Cardenas, former governor of the state of Coahuila, and Ed. Hartman, a large coal mine operator, are back of the project.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—According to press reports surveys are being made for a branch from Thief River falls, Minn., southwest to Grand Forks, N. Dak., about 45 miles. (Feb. 25, p. 429.)

MISSOURI, KANSAS & TEXAS.—A contract is said to have been given to the Patton-Gibson Co. for a change of line and double-tracking from Atoka, Okla., north about 20 miles to Limestone Gap. (Feb. 25, p. 429.)

MISSOURI, OKLAHOMA & GULF.—This company, which was incorporated in October, 1904, to build from Wagoner, Okla., south to Denison, Tex., has been finished to Durant, Okla., and now has 200 miles in operation, including branch lines. It is expected that the extension from Durant to Denison will be ready for operation by July 1. (Feb. 11, p. 329.)

MISSOURI PACIFIC.—An officer writes that the $4,000,000 to be spent during 1910 are for improvements in Kansas. The work will consist principally of ballasting, strengthening bridges for heavier rolling stock, putting in heavier rail and other improvements to roadway. Other improvements to be made on the road have not yet been entirely determined upon. (Feb. 18, p. 379.)

MOUNTAIN VALLEY & PLAINS.—Organized to build from Cimarron, N. Mex., east through the Panhandle of Texas to Guthrie, Okla., thence south to Oklahoma City, about 400 miles. According to press reports, permanent location has been made and grading work is under way from Guthrie west to Kingfisher, 30 miles, and surveys are being made from Kingfisher west towards Hitchcock, in Blaine county. Construction is also under way from Cimarron east. J. H. Conlin, chief engineer, Dalhart, Tex. (Aug. 20, p. 339.)

NEVADA ROADS.—Surveys are said to be under way for a line from Winnemucca, Nev., north to Paradise Hill, thence through the Quinn river canyon to the camp at National and via McDermitt to Caldwell, Idaho, where connection will probably be made with the San Francisco, Idaho & Montana, which has already started work on a line from Caldwell south via a point in Oregon to Winnemucca. R. E. Tilden is in charge of the surveys.

NEW YORK SUBWAYS.—The appellate division of the supreme court has approved the plan for making the proposed Broadway-Lexington avenue line double deck from Houston street, Manhattan, to 103d street, and from 113th street to the Harlem river. The cost will be $10,000,000 less than if the tracks were to be laid all on one level. The proposition originated with the Public Service Commission and has been approved by the Board of Estimate and Apportionment. Four tracks on one level on this route would have occupied a width of 65 ft., and as Lexington avenue is only 75 ft. wide the work would have interfered with the buildings and abutting property and necessitated the condemnation of private property for station sites. (July 9, p. 79.)

NUECES RIVER VALLEY.—Bids are to be asked for about April 1, it is said, to build from Beeville, Tex., west via Oakville, Tilden, Cotulla and Carrizo Springs to Eagle Pass, about 175 miles. There are to be three bridges over the Nueces river and one over another stream. C. K. Conant, Fort Worth, has a contract for some of the work. W. A. Frisby, president, Simmons, and L. Frisby, general manager, Austin.

QUANAH, ACME & PACIFIC.—This company, which now operates 43 miles of railway from Quanah, Tex., west via Acme to Paducah, in Cottle county, is said to have finished preliminary surveys for an extension west. The proposed route from Paducah is west via Yoakum county, Tex., thence to Roswell, N. Mex., about 310 miles. A further extension is projected from Roswell, southwest, about 180 miles, to El Paso, Tex. (Dec. 17, p. 1214.)

RURAL RAILWAY OF MANITOBA.—A bill has been introduced to incorporate this company, with a capital of $200,000 and headquarters at St. Boniface, Man. The plans call for a line to be operated either by steam or electric power from St. Boniface, south along the east side of the Red river to the international boundary at or near Emerson, about 65 miles; also for a line from a point at or near Winnipeg south, on the west side of the Red river to the international boundary near Emerson. Dr. Albert Galliot, Notre Dame des Lourdes; P. Gevaert, N. Bernier, J. A. Beaupre, St. Boniface, and F. Deniset, Winnipeg, are the provisional directors.

SAN PEDRO, LOS ANGELES & SALT LAKE.—According to press reports this line will be rebuilt through Meadow valley wash. It has not yet been decided whether the line will remain permanently in the wash after rebuilding, as this depends upon the final report of the engineers. There are many bridges and stretches of undamaged track in the valley that can still be used, whereas a new route would necessitate heavy construction work. (Jan. 28, p. 171.)

SAN FRANCISCO, IDAHO & MONTANA.—See Nevada Roads.

SOUTHERN PACIFIC.—The Arizona Eastern, which was recently organized, has taken over a number of the subsidiary lines of the Southern Pacific. Plans said to be made to build connecting links and a number of branches for a new route from Denver, Colo., to Los Angeles, Cal. According to press reports from Farmington, N. Mex., that place has raised a bonus of $25,000 for building the Arizona & Colorado, under construction from Gallup, N. Mex., north via Farmington to Durango, Colo., which is to form part of the Arizona Eastern. (Feb. 4, p. 281.)

SPRINGFIELD TRACTION.—Incorporated in Illinois, with $10,000 capital and office at Springfield, Ill. The plans call for a line from Springfield southeast via Pana to Vandalia, about 75 miles. The incorporators include: E. H. Helmle, G. B. Gillespie, G. Riordan, all of Springfield, and C. E. Hazlett, Rochester.

TEMPLE & NORTHWESTERN.—According to press reports a contract has been given to D. J. Grigsby, Dallas, Tex., for building 80 miles of this line. The projected route is from Temple northwest to Hamilton. F. F. Downs and C. M. Campbell, Temple, are said to be interested. (Feb. 18, p. 380.)

VIRGINIA & CAROLINA SOUTHERN.—An officer writes that a contract has been given to Wade & Clower, St. Pauls, N. C., and grading work is now under way on an extension from St. Pauls southeast to Elizabethtown, 30 miles. (Dec. 24, p. 1261.)

WESTERN ALLEGHENY.—According to press reports this company is planning to extend its line on the western end to West Pittsburgh. An extension is also projected on the eastern end from Kaylor, Pa., northeast to Reidsburg, 16 miles. (Sept. 3, p. 427.)

WESTERN MARYLAND.—According to press reports active construction work on the branch from Cumberland, Md., northwest to a connection with the Pittsburgh & Lake Erie at New Haven, Pa., about 83 miles, is to be started within the next 60 days and pushed to completion. (Feb. 18, p. 380.)

Railway Financial News.

Alabama, New Orleans, Texas & Pacific Junction.—A dividend of 2½ per cent. on the preferred A 6 per cent. cumulative stock of this company, which controls the Alabama & Vicksburg, has been declared. The first dividend of 3½ per cent. was paid on this stock in March, 1908. After the payment of the dividend now declared it appears that there are accrued dividends due amounting to 159½ per cent.

Allegheny Valley.—Holders of the $9,998,000 first mortgage 7 per cent. bonds, due April 1, 1910, are offered the option of receiving cash for their bonds or exchanging them at par for general mortgage 4 per cent. bonds of the Allegheny Valley, due 1942, guaranteed principal and interest by the Pennsylvania Railroad.

Brooklyn Rapid Transit.—A judgment for a total of $3,356,938 has been rendered in favor of the Brooklyn Heights Railroad against the Brooklyn City Railroad. The Brooklyn Heights Railroad leased the property of the Brooklyn City Railroad in 1893, and the Brooklyn City Railroad agreed to spend $6,000,000 in improvements and betterments. In the trial it was claimed that the entire $6,000,000 had not been spent on improvements, and that therefore the amount and interest still remaining to be spent should be paid the lessee company. The Brooklyn Heights Railroad, whose stock is owned by the Brooklyn Rapid Transit, pays an annual rental of $1,200,000 to the Brooklyn City Railroad, so that by withholding this rental it can make sure of collecting the judgment.

Chesapeake & Ohio.—*The Wall Street Journal* says that while the Chesapeake & Ohio is negogiating for control, it is in a position to avail itself of an alternative proposition, and that through the friendship of Newman Erb and Edwin Hawley the Detroit, Toledo & Ironton could, if necessary, be made to serve as the Chesapeake & Ohio's short line to the Great Lakes.

Chicago & Eastern Illinois.—The New York Stock Exchange has listed $2,238,000 additional 4 per cent. refunding and improvement bonds of 1905-1955. The amount received from the sale of these bonds has been used for payments on equipment covered by American Car & Foundry Co. notes, series A, and equipment bonds, series B and F.

Chicago City and Connecting Railways.—The Chicago City Railway, the Calumet & South Chicago, the Southern Street Railway, the Hammond, Whiting & Chicago and the Chicago Western have been consolidated under a trust agreement without the organization of a new company. Of the entire stock of these companies 95 per cent., amounting to $23,843,900, has been deposited under the agreement.

Chicago, Rock Island & Pacific.—Speyer & Co. have bought from the company $11,000,000 Rock Island, Louisiana & Arkansas 4½ per cent. bonds. The bonds are secured by a first mortgage on 346 miles of road, and principal and interest are unconditionally guaranteed by the Chicago, Rock Island & Pacific.

Chicago Southern.—See Southern Indiana.

Delaware & Eastern.—Searing & Co., New York, who have been financing this company, having failed, the Delaware & Eastern Railway and the Delaware & Eastern Railroad have been placed in the hands of a receiver. The Delaware & Eastern Railroad has a line of railway running from Arkville, N. Y., to East Branch, 38 miles, and the Delaware & Eastern Railway leases this road and had planned to build extensions to Schenectady.

Detroit, Toledo & Ironton.—Interest coupons of the Detroit Southern, Ohio Southern division first mortgage 4 per cent. bonds, due September 1, 1909, and those due March 1, 1910, were paid on March 1 at the Central Trust Co., New York. See Chesapeake & Ohio.

Grand Trunk.—Sir W. H. White has been elected a director of the Grand Trunk.

Metropolitan Street Railway (New York).—The United States Circuit Court of Appeals has confirmed in most respects Judge Lacombe's order of sale of the property of the Metropolitan Street Railway, and has fixed an upset price of $10,000,000, the successful bidder to receive the property free of any lien.

Michigan Central.—Moffat & White, New York, are offering $1,500,000 4 per cent. Grand River Valley Railroad bonds of the Michigan Central at 97½, yielding about 4⅛ per cent. The bonds are secured by a first mortgage on that part of the Michigan Central's lines running from Detroit, Mich., to Grand Rapids, 84 miles. The bonds are outstanding at the rate of $17,901 per mile, and the remaining authorized $3,000,000 can be issued only to provide funds for betterments and improvements or additions and extensions to the property.

New York Central & Hudson River.—Justice D. Cady Herrick, referee appointed by the New York supreme court, reports that the New York Central is entitled to the injunction which it has asked for to restrain the city from removing the tracks of the company in Eleventh avenue, New York. These tracks are used mostly by freight trains, running at very low speed, but there have been a good many fatal injuries to pedestrians. Referee Herrick holds that the franchise of the Hudson River Railroad, under which these tracks were laid, passed to the New York Central & Hudson River on the consolidation of the Central and the Hudson; that the franchise runs 500 years from 1869, and that the plaintiff will suffer ireparable injury if the tracks are torn up.

Norfolk & Western.—It is reported that the Pennsylvania Railroad has bought an actual majority of the Norfolk & Western stock. On December 31, 1908, the Pennsylvania owned $9,492,000 stock of the Norfolk & Western, and the report just published shows that on December 31, 1909, the Pennsylvania owned $28,500,800 stock. The total stock outstanding (preferred and common having equal voting power) is $89,000,000.

Northern Central.—A committee representing the minority stockholders has been formed to make some rearrangements in the relations of the property to the Pennsylvania Railroad, and to try to secure better terms for the minority stockholders. The committee consists of Joseph Moore, Jr., C. S. W. Packard, Edward B. Smith, R. Lancaster Williams, W. P. Hayward, John M. Nelson and John C. Schmidt.

Pennsylvania Railroad.—See Allegheny Valley and also Northern Central.

Southern Indiana.—This road and the Chicago Southern have been reorganized, and the following directors have been elected: E. K. Boisot, F. O. Wetmore, E. M. Tourtelot, J. C. Hutchins and O. A. Bestel. This marks the passing of these properties from the control of John R. Walsh and his associates. The directors whom they succeed were the following: John R. Walsh, J. W. Walsh, E. C. Ritsher, W. T. Abbott and F. D. Meacham. See Elections and Appointments.

Toledo & Ohio Central.—William Salomon & Co., New York, have bought and resold $1,200,000 Toledo & Ohio Central car trust 4 per cent. certificates. The notes were offered to the public at a price yielding about 4.75 per cent.

Western Maryland.—On March 8 this company is to sell at auction, under a decree of the United States circuit court dated October 9, 1909, $999,650 stock of the Georgia's Creek & Cumberland, $22,750 stock of the Union & Wheeling Shore Line, $100,000 stock of the Buxton & Landstreet Co., and $200,000 stock of the Davis Coal & Coke Co.

Wisconsin Central.—There have been no dividends declared on the non-cumulative 4 per cent. preferred stock since October 15, when 1 per cent. was paid. It is understood that the Minneapolis, St. Paul & Sault Ste. Marie, which operated the Wisconsin Central as its Chicago division, will make no further dividend payments for a while on the Wisconsin Central preferred stock, using instead the surplus earnings for improvements to the property.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Lancaster & Chester has ordered one ten-wheel locomotive from the Baldwin Locomotive Works.

The Boyne City, Gaylord & Alpena has ordered two Mogul locomotives from the Baldwin Locomotive Works.

The St. Louis, Brownsville & Mexico has ordered six 10-wheel locomotives from the Baldwin Locomotive Works.

The Missouri & North Arkansas has ordered two Mikado and two 10-wheel locomotives from the Baldwin Locomotive Works.

The Miller Construction Co., Eldred, Pa., has ordered one 10-in. x 14-in., 36-in. gage saddle tank locomotive from the Vulcan Iron Works.

CAR BUILDING.

The Southern is asking prices on 3,000 coal, 500 coke and 100 flat cars.

The Northern Pacific is in the market for 25 passenger refrigerator cars.

The Chicago, Burlington & Quincy is in the market for 1,000 fifty-ton gondola cars.

The Harriman Lines are asking for tentative bids on a number of passenger cars.

The Erie is said to be asking prices on passenger equipment. This item is not confirmed.

The Southern Pacific has ordered ten 70-ft. gasolene motor cars from the McKeen Motor Car Co.

The Chicago, Rock Island & Pacific has ordered 10 baggage cars from the American Car & Foundry Co.

The Western Fuel Company has ordered 50 hopper bottom gondola cars from the Pennsylvania Equipment Co.

The Missouri & North Arkansas has ordered two second class passenger coaches from the American Car & Foundry Co.

The Public Belt Railroad of New Orleans has ordered 18 dump cars from the McGuire-Cummings Co., Chicago. This report is not confirmed.

The Chicago, Rock Island & Pacific has ordered one 70-ft. gasolene motor car from the McKeen Motor Car Co. This order is the result of a five months' test of one of the 55-ft. cars.

The Western Maryland, reported in the *Railway Age Gazette* of February 11 as being in the market for freight cars, has ordered 400 all steel hopper from the Cambria Steel Co. and 500 steel underframe gondola cars from the Standard Steel Car Co.

The Southern Pacific has ordered 125 electric cars for operation on its Oakland and Alameda lines, inquiries for which have been reported in the *Railway Age Gazette* from time to time. The order includes 40 motor coaches, 25 motor combination coach and baggage cars and 60 trailer coaches. The bodies are 58 ft. long and will be built at the St. Charles, Mo., shops of the American Car & Foundry Co. The trucks will be furnished by the Baldwin Locomotive Works, and the motor and control equipment by the General Electric Co. The contract specifies that delivery shall begin August 15, 1910.

IRON AND STEEL.

Grand Trunk. See under Railway Construction.

Isthmian Canal Commission. See under Supply Trade News.

The Chicago, Indianapolis & Louisville has ordered 5,000 tons of rails from the Illinois Steel Co.

The Mexico Northwestern has ordered 10,500 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The Louisville & Nashville has ordered 5,250 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The Atchison, Topeka & Santa Fe has ordered 26,250 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The New Orleans & Northeastern has ordered 1,500 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The Pennsylvania has ordered from the Jones & Laughlin Steel Co. 1,200 tons of structural steel for the Baltimore, Md., train sheds.

General Conditions in Steel.—All reports indicate a steady improvement in steel shapes and rails. During the past two weeks there have been a large number of car and locomotive orders placed and the steel market is showing the effect of a demand for steel shapes. Specifications for structural steel in the building trades have been held up on account of bad weather. Better conditions in this respect are accountable for an increased activity in structural steel specifications.

SIGNALING.

The contract for signaling the Detroit River Tunnels has been awarded to the General Railway Signal Co.

TRADE PUBLICATIONS.

Engineers' Tape Reel.—Kolesch & Co., New York, has issued a small leaflet descriptive of the Lewis ideal tape reel for engineers and surveyors.

Janney X Coupler.—The McConway & Torley Co., Pittsburgh, Pa., has just issued a catalogue containing a detailed description of its Janney X coupler.

Spiral Conveyor.—The Jeffrey Manufacturing Co., Columbus, Ohio, in pamphlet No. 36 gives a large amount of information regarding the Jeffrey spiral conveyor.

Industrial Railways.—The Ernst Wiener Co., New York, has issued a new catalogue, No. 155, regarding the equipment for industrial railways which it manufactures.

Hawthorne Fan Motors.—The Western Electric Co., New York, has just issued bulletin No. 5,252, suitable for a loose leaf folder and containing detailed descriptions of its Hawthorne fan motors.

Fuel Oil and Gas Burning Appliances.—The W. S. Rockwell Co., New York, has just issued catalogue No. 3, containing a large amount of information valuable to those interested in fuel oil and gas burning appliances.

Lifting Magnet.—The Cutler-Hammer Clutch Co., Milwaukee, Wis., has issued a folder containing a complete description of its Cutler-Hammer lifting magnets. Both half-tone and line illustrations show the construction of this magnet and its use.

Brake-Beams.—The Buffalo Brake-Beam Co., Buffalo, N. Y., has just issued a 9-in. x 12-in. catalogue, printed on heavy glazed paper, containing a large number of half-tone and line illustrations, with descriptions, of its brake-beams and attachments.

Woodworking Machinery.—The S. A. Woods Machine Co., Boston, Mass., has just issued a four-page folder containing excellent illustrations and detailed descriptions of woodworking machinery, including No. 19 eight-roll floorer and No. 20 six-roll floorer.

American Statesmen Series.—The Carborundum Co., Niagara Falls, N. Y., has just issued in small pamphlet form an amusing satire on the life of George Washington. This is one of a series of similar satires by F. W. Haskell, president, is very amusing and well worth reading.

National Motor-Driven Air Compressors.—The National Brake & Electric Co., Milwaukee, Wis., has published a 36-page booklet on the type "3VS" motor-driven air compressors. There are 16 pages of photographs and complete descriptions of the details of both motors and compressors.

Steamship Service in the Tropics.—The United Fruit Co., New York, has issued a pamphlet on its steamship service to the tropics, fully describing the vessels and the points of interest on the trip. The company has also issued a folder giving the sailing dates for all its vessels and connections on the railways owned by the company.

Car Window Screen.—The Imperial car window screen, recently placed on the market by the General Railway Supply Co., Chicago, is illustrated and described in a small folder recently published. The screen allows car windows to be raised to their full height, thus affording passengers fresh air and an unobstructed view while protecting them from dust, cinders and flies.

Uncoupler and Automatic Release.—A full description of the latest developments of the Duplex uncoupler and automatic release is given in a four-page folder issued by the National Railway Devices Co., 490 Old Colony building, Chicago, the makers of the device. Mention was made of this uncoupler in the *Daily Railway Age Gazette* of June 22, 1909, and a full description of its operation was published in the issue of December 24, 1909, page 1265.

Turret Lathes, Boring Mills, etc.—The Gisholt Machine Co., Madison, Wis., is sending out a handsome pamphlet describing its turret lathes, boring mills and tool grinders. It contains exterior and interior views of the large shops at Madison and handsome halftone engravings illustrating the various developments of its turret lathe. This lathe is now built in sizes to swing from 13 in. up to 41½ in., and some of them are combination lathes adapted for large bar as well as for chuck work. These are known as the big bore lathes. The pamphlet illustrates some of the locomotive work which has been done on this type of turret lathe, especially the finishing of eccentrics and crank pins. There is a comparative dimension table for all these different sizes of lathes. The company also manufactures vertical boring and turning mills, and the sizes now furnished range from 30 in. to 84 in. Some of these are illustrated in this catalogue, but the company publishes a special pamphlet devoted to that class of tools. It has reference also to horizontal boring mills and universal tool grinders which the company manufactures. Most of these machines are arranged to be motor-driven and quite a number of the illustrations show them arranged in that way.

RAILWAY STRUCTURES.

Altoona, Pa.—Arrangements have been made for putting up a bridge over the Pennsylvania tracks at Seventh street, in Altoona. The cost of about $75,000 is to be divided equally between the Pennsylvania Railroad, the city of Altoona and the City Passenger Railway Co.

Buffalo, N. Y.—The New York Central & Hudson River has submitted a proposition to the city authorities to improve its passenger and terminal facilities in Buffalo by building a new passenger station at the Terrace, making this the principal station in the city. This site is bounded by the Terrace on the north, the Erie canal on the south, Church street on the west and Erie street on the east. The Lehigh Valley at the same time submitted a proposition, either to join with the New York Central or to build a new station on the Hamburg strip near the present L. V. station in Washington street. It is thought in Buffalo that this plan of the N. Y. C. is more definite than anything thus far proposed, and that an agreement will be reached between the city authorities and the railways. The Central proposal includes plans for using the present Exchange street station for freight.

Canyon City, Tex.—The Pecos & Northern Texas contemplates building a new passenger station to cost $12,000. The present building will be removed and converted into a freight house. The work is to be completed during the present year.

Cedar Rapids, Iowa.—The Chicago, Milwaukee & St. Paul is to build a new roundhouse, yard office, coal chute and sand drying house. The total cost is estimated at $50,000.

Elkhart, Ind.—The Lake Shore & Michigan Southern has announced its plans for building locomotive car shops to cost about $3,000,000. According to local press reports the locomotive shops will be larger than the Collinwood, Ohio, shops, and will employ 3,000 men. (Oct. 8, p. 665.)

Frankfort, Ind.—The Toledo, St. Louis & Western has appropriated $250,000 for new shops and repairs to old buildings. A machine shop and a coach shop are included in the plans for new work.

Hagerstown, Md.—The Cumberland Valley, it is said, will co-operate with the other railways entering Hagerstown in building a new union passenger station at that place. The company also has plans made for abolishing all grade crossings through the city. A roundhouse is to be built outside the city limits, and the company's tracks are to be removed from Walnut street.

Houston, Tex.—About 800 tons of structural steel are on the way, to be used in the construction of the terminal station which is being built by the Houston Belt & Terminal Co. The American Construction Co. has the contract for building the station, and it is expected that work will be completed in December. The improvements will cost about $500,000.

Jamaica, N. Y.—See Long Island under Railway Construction.

Joplin, Mo.—The Joplin Union Depot Co. has been organized to build the union station mentioned in the *Railway Age Gazette* of September 17, 1909. The interested roads are the Gulf, Colorado & Santa Fe, the Kansas City Southern, the Missouri & North Arkansas and the Missouri, Kansas & Texas.

Lebanon, Pa.—The Philadelphia & Reading, it is said, will put up a new passenger station in Lebanon. Other improvements are to be made, including an electric interlocking signal at the Cornwall Railroad crossing. The estimated cost of the improvements is $50,000.

Omaha, Neb.—The Union Pacific has let the contract to the Thompson-Starrett Construction Co., Chicago, for the new office building mentioned in the *Railway Age Gazette* of January 7. The contract price is $1,339,000.

Ritzville, Wash.—See Toppenish, Wash.

St. Louis, Mo.—The Rock Island has plans made for a large independent terminal system in North St. Louis, covering several acres of land. The company proposes to make St. Louis one of its freight and passenger traffic centers, and will spend a large amount of money for improving its facilities.

Sedalia, Mo.—The Missouri, Kansas & Texas has appropriated $175,000 to build a steel freight car shop and lighting plant.

Toppenish, Wash.—The Northern Pacific, it is said, will start work soon on a passenger station, to cost $20,000, at Toppenish, and will also begin work soon on a brick station at Ritzville.

Toronto, Ont.—Property, it is said, is being bought by the Canadian Northern as a site for a new terminal station on Carlton street in Toronto.

A contract is said to have been given to the Hamilton Bridge Co. for building a steel viaduct over the North Wabie river for the Temiskaming & Northern Ontario.

Winnipeg, Man.—It is said that the Canadian Pacific will spend $4,000,000 in 1910 for improvements to be made in the province of Alberta, exclusive of new lines, extensions and the revision of grades and the high level bridge between Edmonton and Strathcona. The plans call for new stations, roundhouses, freight sheds, machine shops, improving the old roadbed and other general improvements. It is also planned to put up a new station at Regina, Sask., and probably one at Moose Jaw. At one of these places $200,000 is also to be spent for new yards, new freight sheds, etc. New 85-lb. rail is to be laid from Calgary, Alb., southward to Macleod, also north to Edmonton, and a large amount of ballasting work is to be carried out. At Macleod an addition is to be built to the roundhouse and the yard capacity increased, at a cost of $50,000. The station at Lethbridge, Alb., is to be enlarged, and at Coleridge, Alb., a roundhouse with six stalls will be built. Terminal facilities will be improved at Weyburn, Sask., also at Swift Current and at Medicine Hat, Alb., $50,000 has been set aside for improvements, including a new machine shop. A new brick station is also to be put up at Red River and 15 or 20 new stations will be constructed at various places. The improvements at Calgary, Alb., will cost about $633,000. This includes an addition to the new station building, to cost $80,000, and a new machine shop, $20,000. A freight car repair shop is to be built, and plans are made for a new freight yard east of the Elbow, Sask., to include a 24-stall roundhouse.

Shop Edition

On March 1, Roy V. Wright, for several years editor of the *American Engineer & Railroad Journal*, became a member of the staff of the *Railway Age Gazette*, with direct supervision of the mechanical department and the Shop Edition.

We take pleasure in announcing that the first prize of $50 in our shop kink competition has been awarded to Elmo N. Owen, general foreman of the Southern Pacific Company at Bakersfield, Cal., and the second prize, $25, to William G. Reyer, general foreman, and J. W. Hooten, foreman of repairs, Nashville, Chattanooga & St. Louis shops at Nashville, Tenn. The geographical distribution of these prizes is interesting; in the three competitions we have held the firsts have been awarded twice in California and once in Indiana; the seconds in New Mexico, Pennsylvania and Tennessee. The prize winners have been employed on the Southern Pacific (two), the Atchison, Topeka & Santa Fe, the Cincinnati, Hamilton & Dayton, the New York, Susquehanna & Western, and the Nashville, Chattanooga & St. Louis. We have printed collections of kinks gathered in California, Florida, Illinois, Indiana, Kansas, Maryland, Massachusetts, Minnesota, Missouri, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Tennessee and Canada, by employees of the Atchison, Topeka & Santa Fe, Baltimore & Ohio, Canadian Pacific, Cincinnati, Hamilton & Dayton, Delaware, Lackawanna & Western, Erie, Lake Shore & Michigan Southern Ry., Nashville, Chattanooga & St. Louis, New York, Susquehanna & Western, Northern Pacific, Northwestern Elevated, Pennsylvania, Rutland, Seaboard Air Line, Southern Pacific, and Terminal Association of St. Louis.

We announce a new competition, as follows: We will give a first prize of $50 and a second prize of $25 for the best article on the subject "How the Foreman Can Promote Shop Efficiency." Each manuscript in competition must be from one thousand to three thousand words long, and must be in our hands by April 15 for publication in the issue of May 6. Manuscripts worthy of publication but not awarded a prize will be paid for at space rates.

This is a subject to which every progressive foreman and shop specialist has given more or less study. A change in the organization of the shop, a new method of handling the work, a rearrangement of equipment or the providing of special facilities often add greatly to the efficiency of a shop, and in some cases have been known to save a railway the expenditure of large sums for providing new or larger shops or additional and expensive equipment.

Tell us just how you have improved the efficiency and output of your shop or department. The shop kinks competitions have brought out a large number of devices, all of which have added to the shop efficiency, but the new competition is intended to have a wider scope as indicated above.

THE PROBLEM OF THE MANAGER.

The greatest problem before engineers and managers to-day is the economical utilization of labor. The limiting of output by the workman and the limiting by the employer of the amount a workman is allowed to earn are both factors which militate against that harmonious co-operation of employer and employee which is essential to their highest mutual good.

Well designed plants and efficient labor-saving devices that are to be seen on every hand bear testimony that the engineer is doing at least a portion of his work well. When, however, it comes to the operation of these plants and the utilization of these labor-saving devices the lack of co-operation between employer and employee very much impairs their efficiency. Increasing efficiency is essentially the problem of the manager.

In considering the subject of management we must recognize the fact that in this country so long as a man conforms to the laws of the state he has a right to govern his own conduct and to act in such a manner as his interests seem to dictate. This fact bars coercion, and it follows that any scheme of management, to be permanently successful, must be beneficial alike to employer and employee, for neither those labor unions that regard their interests as essentially antagonistic to that of employers, nor those associations of capitalists whose only effort is to oppose force with force, can ever effect a permanent solution of the problem of the proper relations between employers and employees. The solution will be one in which employer and employee co-operate for their mutual good. It is the problem of the manager to bring about this condition, and the only type of manager that can accomplish this is the manager who is also an engineer. He can stand between the capitalist and laborer, and understanding the problems of each, do much to effect their solution.

A system of management has been defined as a means of causing men to co-operate for a common end. A permanent system is one that causes them to co-operate also for their common good.

We have outlined in our previous articles the means by which such co-operation can be established, and the intelligent development of these methods will do much for the cause of both employer and employee. It is not a problem to be solved by second-rate men, or by good men at odd times, but one that requires the best efforts of the best men.

THE NEW HAVEN MECHANICAL ORGANIZATION.

In these days of large interests and wide consolidations we hear many comments and some lamentations over the fact that departmental heads of railways are so busy with the executive duties of their positions that they have no time to look after minor matters, and thus lack that personal intimacy with the details and acquaintanceship with the members of their force that was characteristic of the old-time superintendent and master mechanic. That these relations are desirable everyone concedes; that they are attainable even on large systems seems to be proven by the analysis of the organization of the mechanical department of the New York, New Haven & Hartford, in another column. It may be that the short distances existing on this system and the peculiar conditions and density of the traffic render an organization possible that would be impracticable where distances were greater and local conditions different. Still, the methods followed and the means adopted to bring the head of the department into close personal touch with his subordinate, and to keep him posted as to the details of their work are worthy of the most careful consideration, especially by officers who find themselves losing their grip on these things.

A marked feature of the organization is the existence of the staff, with special or assignable duties, whose members are the direct personal representatives of the mechanical super-

intendent and bring to him verbal reports of what they see and do. This serves to do away with much correspondence and facilitates mutual understandings, which means a facilitation of the work to be done and the development of hearty team co-operation. That it does this is shown by the condition of the desks of the master mechanics and their clerks. They are clean, the work is out of the way, and it looks as though they were on the way to realize that ideal of the late E. H. Harriman, who expressed the wish to see his managers sitting back in their chairs before an empty desk thinking—thinking.

Much of the expedition of the work on the New Haven must, of course, be attributed to the extensive use that is made of the telephone, which cuts out a great deal of letter writing, but the main underlying idea of the organization is to put the man in charge close to his work and in close relationship with his subordinates and then give him a free hand and full control, and hold him responsible for results. The offices are in the yards, shops and roundhouses, where physical contact cannot be avoided, and the advantages accruing from the system are shown in the constantly increasing efficiency of the locomotives, the reduced cost of maintenance, the fewer engines required for the work to be done, and above all by the admirable team work that seems to characterize the relations existing between the heads of the sub-departments.

PIECEWORK.

In the term piecework may be included all the various schemes for compensating men *for what they do*, instead of *for the amount of time they work*. It may be divided into two general classes.

1. That in which a price for a job is set from previous records, or from the estimate of the foreman, who generally considers his duty done when he has set the price.

2. That in which a time and a method are set for doing a job after an investigation by the best expert available, other than the foreman, whose duty it is to teach the workmen to do the work in the best manner and the shortest time he finds reasonable.

If in the second case the workman does the job by the method and in the time prescribed, he is paid substantial compensation in addition to his day's pay, which he gets in any case. His foreman and others that supply him with work all get additional compensation when he is successful. The responsibility of the expert in this case does not cease with setting the task, but he must find or train a man to perform it properly. In this he has the co-operation of the foreman, to whose interest it is that the workman should learn promptly.

The first method is the one which until recently has been almost exclusively employed, but in recent years some of the features of the second have been very generally included in order to avoid the troubles that have so frequently followed piecework in the past. The following reasons seem to be amply sufficient to account for all the troubles that have been caused by the first form of piecework.

Records of what has been done are only a very poor indication of what can be done by a capable and industrious workman, and still may be far beyond the possibilities of an ordinary workman who has not had special training in the work.

Estimates.—The judgment of a busy foreman as to how long it should take to do a new job must necessarily be inaccurate, and rates set by his estimates are practically guesses. After the workmen have become skilled their earnings will increase greatly and will often be out of all proportion to the exertion put forth.

Under these conditions an adjustment of the prices based on the new records is made; as the workmen become more skilful it is done again. Thus the more skilled the workman becomes, and the more progress he makes, the greater the penalty he has to suffer, for his prices are being continually reduced so that he earns but little more than the incompetent man, who has never been able to do his work in such a manner as to greatly exceed the old records.

The effect of this method of penalizing the good workman in proportion to his increased effort is to so discourage him that he learns ultimately to limit his output by that of the poor workman. This result is so natural that we should not be surprised at it, nor should we condemn it, unless we make it to the interest of the workman to do otherwise.

The second method, which we recommend, has exactly the reverse effect, and when properly operated provides for a complete system of instruction, compensation and advancement which creates a strong spirit of harmony and co-operation. The essentials of this system are:

Investigation.—To find out before setting a task the best method we can devise for doing a piece of work with the appliances available.

The Task.—When the investigator satisfies himself that he has the best appliances available, and has determined the best method he can devise, to set for the work such a time as he would need if he worked continuously on it at such a speed as he could keep up day after day.

Teaching.—To teach the ordinary workman to do the work by the method developed and in the time set.

Compensation and Co-operation.—To compensate liberally the workmen and all concerned in obtaining the high efficiency that has been shown to be possible.

Experts.—To find among workmen who have learned the best ways of doing work some that can investigate on their own account, and thus gradually get recruits for the corps of experts, so that the system may become self-perpetuating.

Duties of Exports and Foremen.—The foreman of a shop must be an executive, and invariably is so busy attending to his routine duties that he has but little time to make investigations into the best method of doing any piecework. He is usually obliged to give his instructions according to the experience he has had in the past, or according to the knowledge he may pick up at odd times. Again, he frequently feels compelled to allow work to be done inefficiently because he has no man that can do it better and no time to train a new man. For these reasons it is desirable that the development of improved methods, the setting of tasks in accordance with these methods, and the training of workmen to perform these tasks should be in the hands of someone other than the foreman.

For this purpose the best expert mechanic available should be selected. Such a man may not have qualities at all fitting him to be a foreman—in fact, the best expert usually makes but a poor foreman—whose principal function is administration; but he is usually so absorbed in the mechanical operations themselves that the improvement of them becomes a passion with him, and nothing pleases him more than to see numbers of mechanics operating at their highest efficiency, the result of his work. On the other hand, the foreman with this kind of a mind often sacrifices other sources of efficiency for this object.

The expert must be a good mechanic, with fair education. He must have industry, originality, patience, persistence and an ability to remove obstacles, not once, but repeatedly.

Such an expert in a shop will study the machines individually and bring each up to its highest efficiency.

The expert then studies the best way to do each job and makes out a set of detailed instructions for doing it. These instructions are written on a card and are so specific that an intelligent workman can readily follow them. Moreover, the time actually needed for performing each operation is given,

so that the workman may know at each step whether he is doing what the expert expects.

The next function of the expert is to teach the workman to follow his instructions, for few workmen can follow them at first, no matter how clear they may be. Many are willing to try, however, provided they are given proper assistance and assured additional compensation for success. In all cases the workman should have his day's pay, so that he has all to gain and nothing to lose by following the instructions of the expert.

A fair method of compensation is to allow the workman pay for the time the expert needs to do the work plus 25 per cent. of that time. If the workman needs more than 25 per cent. in addition to the time needed by the expert, he should get his day's pay until he acquires proper skill or demonstrates his inability to acquire it. If, on the other hand, he does the work in the time allowed, or less, he should be paid more than 25 per cent., say 30 per cent.

To take a specific case: If the expert sets four hours as the time allowed, the workman would get five hours' pay if he did it in any time between four and five hours. If he took over five hours he would get his day's pay. If he took four hours or less he would get 5.2 hours' pay.

Such a system of instruction and compensation not only attracts good men but stimulates all workmen to make the most of their opportunities, with the result that the shop soon becomes filled with high-grade workmen, who are ambitious to become experts.

If in addition to an equitable system of setting rates and compensating workmen, the foremen, crane men and truckers receive additional compensation based on that received by the workmen, we have a complete system of co-operation, which is the basis of economic production.

CAR SHOPS, OLD AND NEW.

There is perhaps no department of railway work where the contrast between the old methods and the new is more striking than in that of car building, especially freight car building. In the old days there was no mechanical department. There were office force, clerks, timekeepers and the like, and there was a shop force. Draftsmen were a scarcity, if not unknown, and in some large establishments freight cars were built for years without drawings. Sticks were cut to lengths and decorated with a variety of notches, each of which meant something to the man who cut them, until he forgot. Instead of drawings there was a collection of these sticks pushed up over cleats nailed to the second floor joists. All materials were carried about on the shoulders of men or were pushed by hand on lorry cars from point to point. The buildings were light sheds or were sheltered only by the canopy of heaven, and could hardly have been more primitive. Such a thing as a traveling crane was unknown, and there were constant checks to the movement of material, and blockades were the source of continual annoyance.

The material framed under such circumstances did not always fit as well as it might, and holes in adjoining pieces did not always come fair, so that the burning iron was a part of the regular equipment, and the sight of a man rushing from the blacksmith shop to the erecting shed or yard with a red-hot bar was a frequent one.

The change has come gradually, but so steadily that the whole system has changed. In the car building establishment of the present day such things are unknown. The economy and effectiveness of labor is kept in mind at all times. Starting with the drawing room, everything is provided for and there are no missteps in the process. Materials are bought where they can be obtained in the cheapest manner. It does not necessarily follow that a shop in the north, away from the source of supply, can take rough lumber and work it up into sheathing or flooring as cheaply as it can be bought and delivered ready for use. Hence many companies purchase these materials from the southern mills, and no work is required other than the cutting to length. Sheathing may be bought ready for laying and floor and roof boards that can be nailed in place and then cut to the body line with a portable saw. This work, which was formerly done by hand, is now performed with a power saw in a tenth of the time and with a hundredth of the exertion. It is strange that the use of templates capable of quick adjustment and marking was so long in coming to the front. Now, with these appliances, one man can do the laying out for from twenty to twenty-five cars a day and do it in a manner far more intelligible to the workman than in the old method of cross-marking and indexing. Of course the work is itself greatly facilitated by the modern boring and mortising machines. Where adjustments can be made in two planes and heavy material moved by power the time required for the performance of any piece of work is greatly reduced. Aside, however, from size and capacity there has been comparatively little done in the way of the production of new woodworking machines applicable to the car shop for a number of years. It is in the wrinkles and methods that the great improvement has been made.

There are, of course, some special machines, such as the belt-rail checker, where, after the machine has been set, belt rails can be cut or checked at the rate of from two to three a minute, so that it must be a large output indeed that can keep it busy. The same machine can also be adapted to do equally rapid work on carlines and end plates where the former are of wood. Then there are the portable saws, to which reference has been made, as well as the portable boring machines. These latter are not, however, used as extensively as they were a few years ago, now that the system of laying out all parts has been more elaborated. This is especially true for new work, for the portable boring machine is still indispensable in the repair yard.

One of the greatest economies of the modern car shop arises from the introduction and extended use of the traveling crane. It has served a double purpose; it affords a rapid means of transportation of heavy materials from the point of production to the point of use, and has supplanted the lorry car with its limited field of operation, confined, as it was, to the rails upon which it must run. Then this combination has done away with the blockading of the material routes. With the crane serving both the machines and the erecting floor, quantities of material can be picked up and distributed in half the time that would have been required to load it on the cars, and each machine operator can utilize the floor space about him to the best advantage without a thought whether or not he is blockading his fellows. Of course, the traveling crane in such a shop would be an impossibility if shafting transmission was in use, because of the interference with the belting. But with electric transmission the crane can move freely. In fact, the introduction of the traveling crane in the car shop, as well as in the machine shop, has depended directly upon the prior introduction of the individual tool drive. At present there seems to be no question about the desirability of this individual drive, and, in the light of what is being done it is strange that the economies to be effected in the handling of material was not realized and urged before they were, as an additional inducement to the doing away with belts and shafting.

There is one point of economy that does not seem to be fully realized, though it was learned years ago in the machine shop. It is that physical comfort goes hand in hand with speed and efficiency of working. The old idea that a cold shop was an incentive to the workman to hustle and exert himself so as to keep warm has been exploded long ago. A warm shop increases the output, and it is recognized that economy demands a high output with piece work as well as with day

work. It is strange that so many car shops are allowed to be cold in winter when so good a dividend could be obtained on the cost of warming them. Sometimes even the paint shops are run without heat, and lack of light is also not unknown. As for the methods of painting, the three coats are regarded as sufficient, and a quick-drying article is invariably used; something that will dry hard enough for the following coat in ten hours. But in the application of the paint we are back to the methods of the early days, with the exception of the width of the brush, which has grown to whitewash proportions. We tried the mechanical method of spraying a few years ago, and it appeared to be so successful that almost universal adoption was the result. But even the paint on a freight car must be laid with some care, and the admixture of the water of condensation with the compressed air cut down longevity to such an extent that the process was discredited, to say nothing of the waste of material and blistering, with the rapid incapacitating of the workman because of the atmosphere he was obliged to breathe. So car painting is back to about where it was years ago, except that some spraying is still done on trucks, and a few pieces are treated to the abomination of dipping. In the iron work the machinery is simple and of limited variety. Hand work in the blacksmith shop has almost entirely disappeared, and in its place we have the header, forging machine, steam hammer and bulldozer for making even the most complicated shapes. And, when the quantity of the output is considered, it is surprising to see what a very small addition is made to the pound cost of the iron or steel used. Where a man will work up a ton and a half of material a day into bolts, the added cost is well within the cent. The die has taken the place of the hand hammer, and as we saw in connection with some of our blacksmith kinks, has cut the cost down from dollars to cents.

Piecework is a highly important element, if not the most important element, in the reduction of car construction costs. Its introduction is universal, and it would be difficult to find a railway or private shop where it is not in full force and operation. This is one of the best examples of the working out of the modern economies of shop practice, and it has resulted in such an enormous increase of efficiency that its value cannot be estimated. Indeed, it is only by the combination of all these elements, increased capacity of tools, facility in handling material, and placing the individual upon his own merits and paying him for what he does that it has been possible to keep car construction costs down to what they are and so to counterbalance the increase in cost of materials and labor that deliveries can be made for what the railways can afford to pay.

FINISHING PISTONS AND DRIVING BOXES.

Continuing our investigation of the time required to finish locomotive details, we have returns from enough representative shops to indicate the variation between good and poor practice in finishing piston rods, piston heads, driving boxes and driving shoes.

TABLE 1.—*Piston Rods.* (*Turning includes cutting thread.*)

Shops.	Diameter.	Hours—Turning.	Grinding.	Total.
A	4 in.	4	4	8
B	4 "	6	1	7
C	4 "	3	⅓	3⅓
D	4 "	1⅓	⅓	1⅔
E	3 "	2½	½	3
F	4 "	3¾	¾	4½
G	4 "	2¼	½	2¾
H	3¾ in.	3	2	5
I	4 in.	3½	½	4
J	No grinding	4 "	7	0	7
K	No grinding	4 "	4½	0	4½
L	4 "	2	⅓	2⅓
Average		3.6	1	..

A 4-inch plain steel piston rod is assumed for purposes of comparison, and the work of finishing includes turning from the rough forging, grinding and cutting the thread on one end. On some piston rods the taper end is larger than the body of the rod, and there is a collar with fillets on each side. These require extra time, which accounts in a measure for some of the large differences found in the reports. Thus, one of the best locomotive shops, that is, one well managed and provided with modern tools, reports the largest number of hours, and is one of those which does not grind rods. It is possible that the time required to finish the rod smoothly and polish it on a lathe is so much longer than that required if finished by a special grinder that it appears excessive. The time required to turn a piston rod is reported as high as 6 to 7 hours, and the average time is 3.6 hours. This average includes several low figures which are evidently reported for a smaller amount of work than is usually required, and 4 hours can be taken to represent time required for lathe work in finishing a 4-inch piston rod of ordinary shape.

Most of the reports indicate that grinding machines of some form are employed for finishing piston rods, and the various times given is perhaps an index of the character of the machine used or else a larger amount is left to be ground than is necessary. The time reported for grinding averages 1 hour, though one shop reports 2 hours and another 4 hours. With a good modern grinder and good judgment as to the amount left to be ground, the work should be easily done in three-fourths of an hour and a number of roads report doing it in a half hour.

TABLE 2.—*Piston Heads.—Boring and Turning.*

Shops.	Hours—Cast iron.	Cast steel.
A	3	5
B	..	4½
C	4	..
D	1½	..
E	2¾	..
F	2½	..
G	2	2½
H	1¾	..
I	8	9½
J	2½	..
K	1½	..
L	..	4½
M	..	4½
Average	3	4½

While there is some variation in the shape of locomotive piston heads on different roads, the majority of them are like a thick hollow disk with a slight tapering of thickness at the circumference. The time for finishing includes the turning of the outside surface, the cutting of grooves for packing rings and boring the taper fit for piston rod and the counter bore for the large nut. The majority of these heads are cast iron, this being used because it is less liable to cut the cylinder than cast steel, though several roads report the use of cast steel also. The average time reported for cast iron heads is 3 hours and for cast steel 4½ hours. Individual reports show 4 to 8 hours for cast iron heads and two shops report only 1½ hours. The latter can only be attained by the most improved machine, and corresponds to the best performance of a vertical turret lathe working with two cutting tools at once. The average of the reports, 3 hours for finishing a cast iron head, shows good work for this detail when it is performed on a horizontal lathe. When the work is done on a boring mill it may be reduced to 2½ hours and on a horizontal turret

TABLE 3.—*Finishing Cast Steel Driving Boxes.*

(Planer, finishing sides and shoe fits; slotter, for brass and cellar fit; lathe, turning driving brass; boring machine for driving brass; shaper, finishing cellar.)

Shops.	Hours—Planer.	Slotter.	Shaper.	Lathe.	Boring.	Total.
A	6	1¾	1¼	1	¾	10¾
B	4	3½	¾	½	½	9¼
C	3	1½	½	½	½	6
D	1½	1	½	½	½	4
E	3	2	¾	½	¾	7
F	..	3	1	1	1	..
G	1½	1½	¾	½	½	6½
H	4	2¾	½	⅓	⅔	8½
I	3	1	¾	¾	1	6½
J	3	2	½	⅓	½	6½
K	1½	1½	⅓	⅓	½	3⅔
L	3	4	½	½	¾	7¾
M	4	1½	½	¾	½	6½
Average	3	2	.65	.6	.65	7

lathe to 2¼ hours, and the shortest time is required when the head is finished on a vertical turret lathe, when 1½ hours is regarded as a good performance for finishing a locomotive piston head 27½ in. in diameter.

The majority of railways are now using cast steel driving boxes, and we have confined our inquiry entirely to this material. These castings are so rough and the amount of surface is so large that there is a tendency to dispense with finish as far as possible, and in a number of shops it is now the practice to cast the brass bearing and the hub liner directly on to the rough box, thus saving not only the cost of finishing that part of the box, but of finishing the one face of the liner also. This practice effects an economy of about 75 cents per box, or about 25 per cent. of the finishing cost. On a few roads the practice is carried still farther, and bronze liners are cast directly on to the bearing surface for the shoe and wedge, and this bronze is finished more rapidly than the hard scale of the cast steel. By placing a large number of boxes on a long planer, it is possible to take almost a continuous cut over a large surface and the rate per box becomes small, so that although the milling machine would appear to be a more economical one for finishing the outer faces and shoe bearings of driving boxes, it has not been used for this purpose to any extent. The time required for the planer work as ordinarily performed in finishing boxes is reported to average 3 hours, some shops taking as high as 4 to 6 hours. To finish a steel driving box on a planer in 3 hours is very good work, and about the only way to reduce the cost is to dispense with much of the work and cast the bronze face directly on to the steel. The circular fit for the journal bearing is usually finished on a slotter, and the time as we report it is based on that method. This work can also be performed on a planer with a special revolving cutting tool and the draw cut shaper is often employed to advantage for this operation. The average time reported for slotting is 2 hours and the maximum is 4 hours. It is doubtful if this average time can be much reduced, though it is claimed for the draw cut shaper that it will effect a saving of 25 to 40 per cent. over ordinary methods. The brass bearing is required to be turned and bored, though the outer surface is often finished on a slotter or a shaper. The draw shaper is also well adapted to this operation. The time reported for shaping the outside of the bearing averages .65 hours, though a number of shops report ⅓ of an hour, which is more nearly correct for good work, and the same is true for the lathe work in boring brass for journal fit. The total time for finishing a driving box complete, including brass fitted, averages 7 hours, which represents very good practice.

TABLE 4.—*Driving Wedges and Shoes—Planing or Milling.*

Shops.		No. finished.*	Shops.		No. finished.*
A		12	I		8
B		21	J		30
C		9	K		22
D	On milling machine..	40	L		15
E		20	M		20
F	Mill frame fit.....	9			
G		10	Average	.....	18
H		24			

* In 10 hours.

The finishing of shoes and wedges is a plain, straight operation which would appear to be an ideal one for a milling machine, yet only one shop reports the entire finish of wedges and shoes by milling, and it finishes the largest number, 40 in ten hours. Another shop, which mills the frame fit only, does not derive much advantage from the use of that method, as it reports only 9 shoes in ten hours, while the average for all shops reporting is just double that, 18. This average must be regarded as very good work when the ordinary methods are used, that is, finishing on the planer or shaping machine. The heavy cuts and rapid work now performed by milling machines should make it possible to double the average output here reported and finish up 35 to 40 shoes or wedges in 10 hours.

Contributed Papers.

THE ORGANIZATION OF THE MECHANICAL DEPARTMENT, NEW YORK, NEW HAVEN & HARTFORD.

BY GEORGE L. FOWLER,
Associate Editor of the *Railway Age Gazette.*

In these days of large interests the methods of the old regime are unsuited to the requirements of the situation, and in every department there must be an executive head who is responsible for every detail and yet to whom the personal attention to these details is an impossibility. The result has been that, in American railway affairs, there has grown up a statistical department upon which the executive head is dependent for guidance. There is a difference, however, between reading cold statistics that are offered without comment and being in close touch with the men in the field who furnish the data for those statistics. The atmosphere of the situation is lost, for it is axiomatic that the closer the leader can be associated with the workers the more efficient will be this leadership. It is, therefore, for the purpose of keeping up this closeness of touch and of providing a means of direct communication between the subordinate and the head of the department, that the mechanical organization of the New York, New Haven & Hartford is based.

The main idea is to put every shop and roundhouse into personal relationship with the mechanical superintendent and avoid the filtration of reports through a number of channels before they reach their destination, and so receive the inevitable coloring that must result from such a filtration. That the mechanical superintendent should be in close personal touch and communication with these innumerable points of local activity is, of course, out of the question, and it therefore becomes a matter of moment to make the means of communication between the two as direct and as free from circumlocution as possible.

PERSONAL STAFF.

For this purpose the mechanical superintendent has surrounded himself with a personal staff, men to whom certain duties are assigned and who can be detailed for special services. They have no one directly responsible to them and they report directly to the mechanical superintendent. They stand in the same position to him as the aides and staff officers of an army do to the general in command. They have no direct commands themselves, but they are the message bearers of the chief and have authority to act in emergencies. By this means the most remote of the roundhouse foremen are put in direct personal communication with the head of the department and are thus in a position to demonstrate local conditions and receive instructions with the minimum of red tape and prejudice.

This arrangement does away with some of the subordinates that are usually to be found on American railways, such as assistant superintendents of motive power, who stand between the general superintendent of motive power, or mechanical superintendent, and the line, and to whom all or nearly all subordinates usually report, and by whom these reports are sifted and only that which the assistant may consider necessary is transmitted on to the head of the department. The New Haven organization cuts this out and reduces it to its simplest form.

It is not claimed, of course, that this organization is the best or that it would be possible of application on other and larger systems. The New Haven line is peculiar in that it is a large system, occupying a small territory; that it has one short main line but 233 miles long; that it is a perfect spider web of branch lines, and that though it has a mileage of 2,044, the extreme point to which these lines run, Provincetown, Mass., is but 323 miles from headquarters in New

Haven, Conn. This compactness greatly facilitates the work of intercommunication and reduces the number of telegrams and letters that must be transmitted, for the whole system is covered by telephonic communication, and any officer can sit at his desk and speak with not only any other officer but with any subordinate. In addition to this, at each center or terminal the company has an arrangement with the local telephone company through which connection is made with any subscriber, thus completing the system and putting each officer in touch with the outside world.

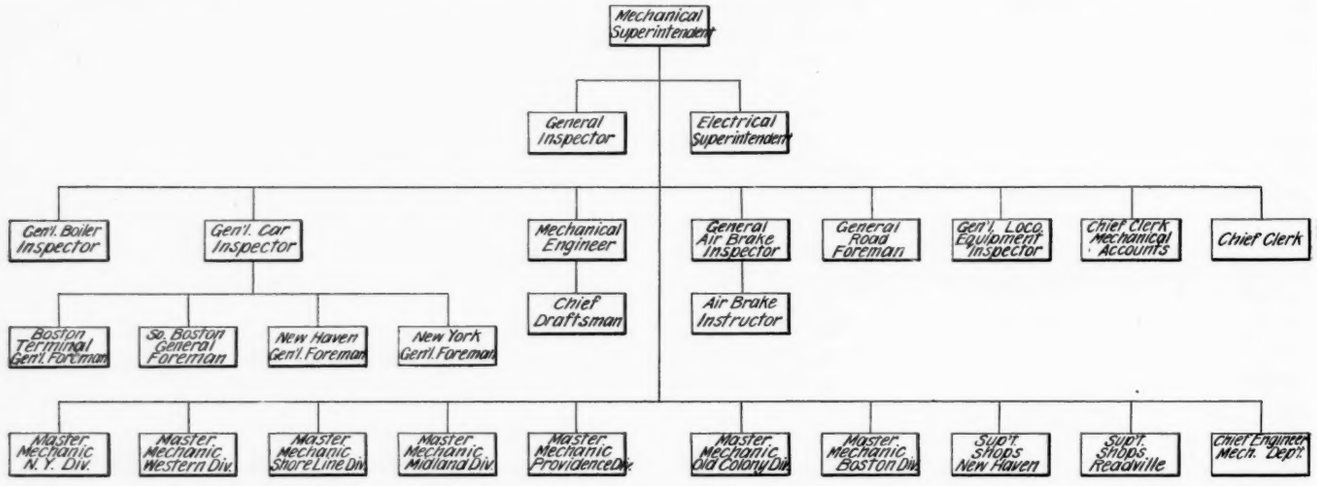
Hence, in case of emergency the mechanical superintendent can get at once into direct personal touch with any of his employees and obtain a quick, first-hand report of the situation as it exists. This possibility has done away with the necessity of those personal interviews and meetings that are usually held at stated intervals on most roads and which owe their existence solely to the fact of that underlying principle of business that, if you have anything of moment to transact, it is best to see your man. So, where an executive head is separated by hundreds, perhaps thousands of miles from his subordinates, and it means a journey of days to meet, periodical interviews or meetings are a necessity to good management. But where the head of the department can spend most of the morning at his own desk and the afternoon at any one of the important points on the whole system, these visits to and fro become such matters of daily or frequent occurrence that set dates for meetings would be superfluous, so that there are no regular meetings of the line and staff of the mechanical department on the New Haven road.

The one seeming disadvantage of this method is that men of the same rank, such as master mechanics, are not forcibly brought together and so led to discuss matters of common interest to the benefit of themselves and the service. But it will be seen later that the territories under the immediate control of these men dovetail into each other to such an extent that there must be a large amount of direct communication between them, so that each is cognizant of what the other is doing, and the density of the passenger service and the shortness of the distances is such that personal interviews may be made as frequently as an occasion may arise. In fact, any master mechanic could visit any other, or one shop superintendent another, and his absence from his own office be hardly noticed. Keeping this possibility of instant telephonic communication in mind, it appears, then, that the whole organization is in the position of being constantly in meeting session without the formality of actually coming together. This does not mean, however, that there are no meetings of the staff. For while there are no regular assemblings, still, from time to time as occasion demands it the master mechanics and superintendents of shops, in fact the entire staff of the mechanical superintendent, are brought together to discuss matters of mutual interest.

ORGANIZATION OF THE MECHANICAL DEPARTMENT.

The department of the mechanical superintendent includes the charge of all locomotives and other rolling stock, the shops, roundhouses, elevators, power houses and vessels, the latter including not only tugs and lighters, but the passenger train transfer steamers plying between the Harlem river terminal and Jersey City in the through Boston-Washington service. The mechanical superintendent reports direct to the general manager, who in turn reports to the president, while the subordinate officers report to the mechanical superintendent. There are a number of these, however, who make dual reports. For example, the electrical superintendent, who is shown on the diagram as reporting to the mechanical superintendent, also reports to the division superintendent and to the engineer of maintenance of way. To the mechanical superintendent he reports on matters relating to the machinery under his charge; to the division superintendent on all traffic matters, and to the engineer of maintenance of way on all matters pertaining to that officer's department, such as catenary construction, rail bonds and the like. These reports are separate and distinct and do not in any way conflict with each other. Nor do they imply a divided authority and responsibility. The same thing holds true of the master mechanics, who report, as on other roads, to the superintendent as to traffic matters and to the mechanical superintendent on mechanical affairs.

We are dealing, however, now with the mechanical department only, and so, in the diagrams, the cases where dual or triple reports are called for will not be indicated, as they may be considered outside the province of this discussion.



General Organization of the Mechanical Department; New York, New Haven & Hartford.

The preliminary distribution of the responsibility is shown, then, in the diagram of the general organization. In this the president stands at the head, to whom the general manager reports. The mechanical superintendent reports to the general manager, and he in turn receives reports direct fom the master mechanics, the electrical superintendent, the superintendents of shops, the superintendent of the marine department and his own staff.

As this staff is one of the main characteristics of the whole organization it will be well to consider it first in detail. Referring to the diagram of the men reporting direct to the mechanical superintendent, it will be found to consist of ten individuals and two classes. The individuals are the general inspector, mechanical engineer, electrical superintendent, general car inspector, general air brake inspector, general boiler inspector, general road foreman of engines, chief clerk, chief clerk of mechanical accounts, and tool equipment inspector. The two classes are the master mechanics and superintendents

of shops. Of the individuals some are free lances, detailed for special work, endowed with authority to act and give orders, responsible directly to the mechanical superintendent, and having no employees or subordinate officers directly responsible to them. No one reports to them and no one looks to them for instructions, but any line officer may receive instructions and orders direct, or the same may be given direct to their subordinates, supplemented with a statement to the official as to what has been done. Others, such as the mechanical engineer and chief clerk of mechanical accounts, have other employees under them and are sub-departmental heads.

With this general statement as to the conditions obtaining attention is directed to the specific duties of the individuals reporting direct to the mechanical superintendent.

GENERAL INSPECTOR.

The general inspector might perhaps be called an assistant to the mechanical superintendent in locomotive affairs. His duties are to look after all roundhouse operation, to see that the general policies and instructions of the mechanical superintendent are carried out, and for this he has the authority to issue orders, that instructions be followed, but not to make any changes. In cases of emergency he has authority to issue orders. No one reports to him and no one looks to him for instructions, and he reports to no one but the mechanical superintendent. While his work is officially confined to the locomotives and roundhouses, he is also expected to report and comment upon anything relating to the car department that may be brought to his attention. In case, also, it appears to him that there should be any changes made in the methods of work, either locally or as a whole, he will make his recommendations to the mechanical superintendent, who will himself issue the orders accordingly. His regular duties may then be summed up in the statement that he is expected to so look after roundhouse methods that they are kept up to the top notch of possible efficiency. In addition to this regular work the general inspector is also subject to assignment to special services by the mechanical superintendent, and this may cover anything in the wide domain of the department. He has an office but no office force, not even a stenographer. His written reports are few and meager; any letters that he may desire to write are dictated in the office of the mechanical superintendent, to whom he usually makes his reports verbally.

GENERAL CAR INSPECTOR.

The general car inspector occupies the same position as to the car department that the general inspector does to the locomotive work, with the exception that he is in direct personal charge and is directly responsible for the work done on the cars at the New York and South Boston terminals and in New Haven. At these points he has charge of all car cleaning and repairs. At other places he has control and supervision of car repairs. Because of these duties and because of his immediate supervision over the three points named he is obliged to keep certain records and maintain more or less of correspondence, so that he has an office force of one clerk and one stenographer, at Boston and New Haven.

The mechanical engineer's duties are those usually pertaining to the position. He is in direct personal control of the drawing room, where he has a chief draftsman to take control in his absence. He, of course, works out all new designs and sees to it that the standards of construction are maintained in the shops. In addition to this he checks off all material and requisitions to see that both are in accordance with specifications and standards. No departmental heads report to or through him, and he has no authority to change practices or standards. If such changes are to be made the suggestions are made by the interested official to the mechanical superintendent, who then takes it up with the mechanical engineer for working out. This does not mean, of course, that there is no prior consultation between him and other subordinate officials before it is presented to the mechanical superintendent. For it is quite possible to have these prior conferences and reach a mutual decision as to what may be recommended, and so reduce the time required to reach a final decision.

ELECTRICAL SUPERINTENDENT.

The electrical superintendent has charge of the locomotives and electrical equipment in use on the New York division. As already stated, he reports to the superintendent and engineer of maintenance of way on traffic and construction matters, respectively, and to the mechanical superintendent on those things relating purely to the mechanical details of the locomotive construction, maintenance and operation.

GENERAL AIR BRAKE INSPECTOR.

The general air brake inspector has charge of the air brake equipment of the road, and this includes the air brake instruction car. Of the latter the details are under the charge of an air brake instructor, whose duties are of the regulation sort and for whom an instruction car is provided. The general air brake inspector works alongside the general car inspector, the duties of the two interlocking, but not conflicting, and each reports to the mechanical superintendent.

GENERAL BOILER INSPECTOR.

The general boiler inspector looks after the condition and care of the locomotive boilers. This involves the responsibility of attending to it that the boilers are washed and inspected at regular intervals so as to comply not only with the regulations of the company as applicable to the New England service, but also with those of the New York state law. For the latter a special record is kept. It is simple, and in addition to the cards sent in from the roundhouses where the work is done, there is a board in his office marked off into vertical columns and numbered from 1 to 31 for the days of the month. In these columns there are holes for pins, the head of which carries an engine number. These numbers are those of the locomotives assigned to runs that enter New York. The board is further divided into halves by a horizontal line. When a boiler is washed and reported the corresponding pin is placed in a hole in the column of the day on one side of the horizontal line. As the law requires that this washing shall be done at least once a month it is evident that, at the end of each calendar month, all of the pins are on the same side of the line. They are then moved over to the other side for the next month as each is washed and reported. In this way quick track can be kept of every locomotive in the service. In addition to the washing the general boiler inspector also looks after the repairs. He sees to it that the boilers are kept up to the specified standard of condition, that the tubes are tight, that patching is properly done, and that they are in a safe and efficient condition.

GENERAL ROAD FOREMAN OF ENGINES.

The general road foreman of engines supplements the work of the division road foreman and also interlocks with the duties of the general inspector. It is his duty to oversee the engines of the whole road, paying particular personal attention to those that are in through service, which run beyond the bounds of any one division. For example, a locomotive hauling a through train from New Haven to Boston runs over the Shore Line, the Providence and the Boston divisions, and so passes through and beyond the jurisdiction of any one division road foreman of engines. He also serves as a check on these division foremen, supplementing their work and serving as a means of supervising what they have done. His work also interlocks with that of the general inspector. His duties are to see that the engines are kept neat and clean and in a proper state of repair, so that he is apt to see and call attention to any neglect that may have escaped the general inspector. He reports to the mechanical superintendent and his, with those of the division road foremen, are thus brought together, so that the head of the department knows at all times what engines are receiving

attention on the road and what each foreman has done and is doing during the month.

CHIEF CLERK.

The chief clerk is, of course, the buffer between the mechanical superintendent and the outside world, as well as the routine work of the department. On him devolves the necessity of attending to all of the correspondence and of relieving his superior from the many details that must be taken care of in the daily routine of the office.

CHIEF CLERK OF MECHANICAL ACCOUNTS.

The chief clerk of mechanical accounts has charge of the accounting room. It is here that the reports of locomotive performance are drawn up, where costs are estimated, the payrolls checked, and the other details of car and locomotive accounting cared for.

GENERAL EQUIPMENT INSPECTOR.

The general equipment inspector looks after the tool equipment of the locomotives. In this he supplements the work of the road foreman of engines, who also sees to it that the locomotives are in proper condition for service.

EFFICIENCY OF THE ORGANIZATION.

It will thus be seen that the mechanical superintendent is brought into close contact and touch with the details of the work, and yet is spared the strain and consumption of time that would be involved were he to attend to these matters in person. The members of his staff are freelances, who can go and come as necessity may dictate, and who can give a first-hand, unprejudiced report as to the conditions existing on the road. This is really the key to the efficiency of the organization, that it enables the mechanical superintendent to be the head of his department not only in the matter of general policy and the conduct of affairs, but also in the refinement of the details, without being burdened and overwhelmed by the necessity of personal attention to and care of those details. This work falls upon the shoulders of the staff, as we have seen. Someone once said, in commenting on the Old Colony Railroad, that it was a great system, composed of a mass of branches and no main line. If we except the direct line between New York and Boston, the same statement holds fairly well for the present New Haven or consolidated system. The map presented shows how these numerous branches interlock and cut across each other, forming a complete spider-web of rails over the whole of Connecticut, Rhode Island and eastern Massachusetts, with tentacles reaching northward up the valley of the Connecticut river to Turner's Falls and to Pittsfield in the Berkshires, and westward to New York. The suitable arrangement of this territory and network into working and workable divisions was quite different from that of an ordinary railway that can be cut up into suitable lengths of from 100 to 150 miles. Here there were the multiplicity of interests and movement of trains to be taken into consideration, and that with an engine and car movement even more complicated than that of the trains.

THE DIVISIONS.

Speaking broadly, the New York, New Haven & Hartford may be divided into two grand divisions, one tributary to Boston and the other to New York, and the dividing line between them may be taken to pass through Willimantic and Saybrook, Conn. A brief study of timetables and train movements would show, however, that such a typical division would not be practicable for working purposes. Therefore, the whole has been split up into a number of minor parts. The reasons for the particular arrangement adopted involve too much of complicity to be dealt with here, so that the mere physical facts will be given, with an occasional underlying reason therefor.

The road is divided into seven operating divisions: the New York, Western, Shore Line, Midland, Providence, Old Colony and Boston, each of which is indicated by special lining on the map. The New York and Boston divisions cover the smallest areas and the densest traffic. The New York division simply includes the electrified section extending on the main line from the Grand Central station to Stamford and thence up the electrified branch to New Canaan. The Shore Line division takes up the main line at Stamford and holds it through to New London and Springfield, as well as on the old New Haven and Northampton line, which now extends up to Shelburne Falls and Turner's Falls. It also takes in a few branches as well as the line from Hartford to Fenwick. The Western division takes in the network of lines to the west of the Connecticut river and to the west and north of the Shore Line. The Providence division takes up the continuation of the main line at New London and holds it to the limits of the Boston division at Readville, including the two main lines between Boston and Providence, as well as branches extending to Worcester and Fall River. It cuts out into and interlocks on the west with the Midland division. Its tentacles are, however, few, and it is mostly confined to a narrow strip of territory bounding the main line.

With the exception of the old New York & New England, which forms a through air line between New Haven and Boston, the Midland division is a branch line road and fills the same position east of the Connecticut river that the Western division does on the other side. A third division of the same character is the Old Colony, which covers the whole Cape Cod territory with the main line between Boston and Fall River, with long tentacles cutting through the Providence division and reaching to Fitchburg and Lowell in the northwest. The last is the terminal division of Boston, which includes all of the territory within a radius of about 15 miles from the terminal station. A study of the map will show that this arrangement is a natural one and that the divisions are so arranged that through cars and engines cover the minimum number and that there are the fewest possible interchanges of power.

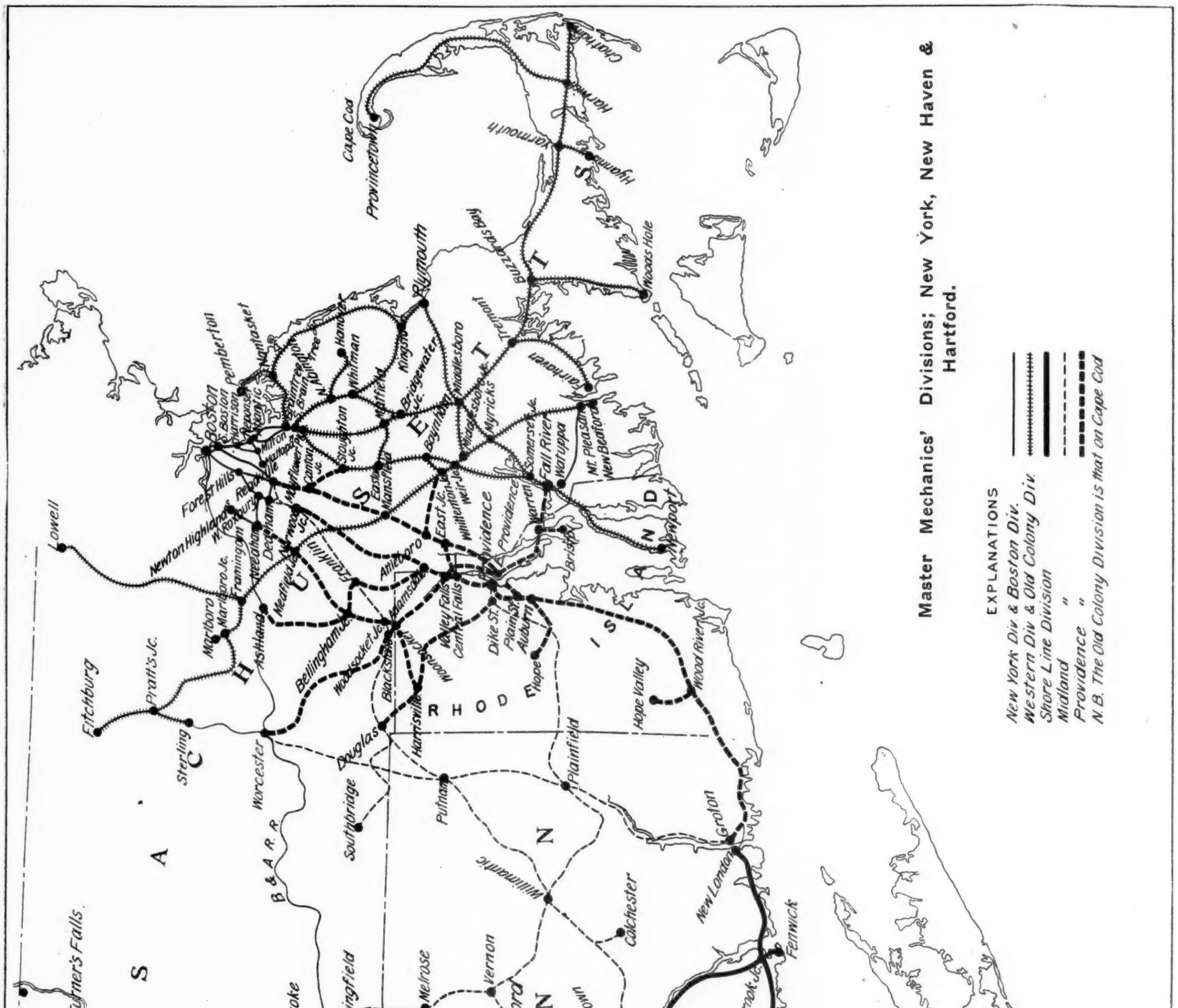
THE DIVISION ORGANIZATION.

A master mechanic is in charge of all motive power and cars on each of these divisions, whose duties correspond to those of the same position elsewhere. He is held responsible for the condition of the rolling stock and is in immediate control of all roundhouses and repair yards, reporting direct to the mechanical superintendent on all matters mechanical and to the division superintendent on traffic. His force, in addition to his personal assistants in his office consists of the roundhouse foreman and their men. He has reporting to him the roundhouse foreman, the road foreman of engines of his division, the car foreman, the car inspectors. In the case of the master mechanic of the New York division there are two road foreman of engines, one for the electric and the other for the steam locomotives. On the Providence division he receives reports from the chief engineers of the Providence, Warren & Bristol power house and the Providence station. In the case of the Boston division the master mechanic's jurisdiction also includes the chief engineers of the Nantasket and Back Bay stations with the coal docks at South Boston and Dover street.

This organization of the master mechanics' department is clearly shown on the diagrams, and its effectiveness is indicated by the fact that in no case is an inspector, engineer or foreman more than once removed from the mechanical superintendent. This broadening of the work on the divisions puts each master mechanic in close personal touch with every man in his employ with the resultant increase of the efficiency as a whole.

The number of places in charge of a master mechanic varies with the division and, to an extent, inversely with the density of traffic. The largest number of roundhouses on any one division are on the Old Colony where there are 22. Still, the distances are so short that it is a comparatively easy matter to reach any one of them.

The master mechanic, then, is responsible for the cars and



Master Mechanics' Divisions; New York, New Haven & Hartford.

locomotives while they are in service. He receives them from the main repair shops, cares for them in the matter of running repairs until they need to be returned to the shop for general overhauling. He has nothing to do with the machine when it has passed the repair shop door, with one exception, until it emerges again for another period of service. But in this case he must see to it that engines are always ready and available for all of the services for which they may be required. This involves the usual multitude of details, of cleaning fires, sanding, water, wiping and light repairs. That the work may be properly done requires an organization as complete and as complex as that of the main organization of which it forms an important part. These organizations vary from point to point dependent upon the amount of traffic handled on the division as well as the character of that traffic, a condition that is clearly set forth in the divisional diagrams.

BOSTON DIVISION.

As the first example, take the master mechanics' organization of the Boston division. The territory covered is the smallest of any on the road, and the total mileage is but about 46, yet the train mileage is the greatest of any, and the rapidity of movement is very great. At the South Boston terminal, for instance, there are periods of the day when as many as ninety trains are received and despached in an hour. The division, too, is large enough to include much of the suburban work; that is the whole of the run, so that, in spite of the limited area where the most distant point is but 16 miles from the terminal, there are a number of roundhouses falling within the jurisdiction of the master mechanic in charge. There are two at South Boston and one each at Cohasset, Dedham, Glenwood avenue, Matteapan, Needham, Roxbury, South Braintree and Allerton. Of the lot those at Roxbury and South Boston are the most important. At Roxbury are the old shops of the Boston and Providence R. R. where moderately heavy repairs, classified as Nos. 4 and 5, to be explained later, are made. Here there is a general foreman reporting direct to the master mechanic and to whom, in turn, the foreman of the several departments of the shop and the roundhouse with the engine despatchers report. On the diagram it will be seen that there are four gang foremen taking orders from the foreman machinist. There are the erecting gangs, and they differ somewhat in their organization from those in the erecting shop at Readville as will be noted later. Each of these gangs is complete in itself. That is to say, it can and does do all of the work upon a locomotive instead of parceling it.

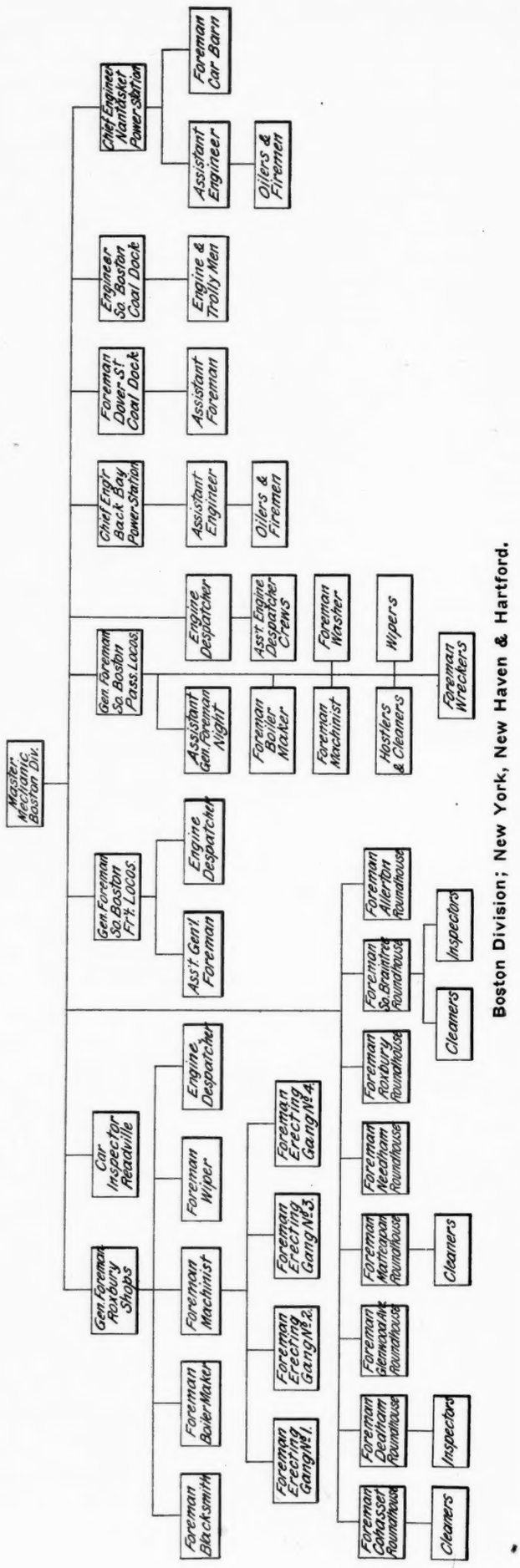
At the South Boston passenger roundhouse there is an assistant general foreman who is in charge of night work, to whom all subordinates are represented as reporting, but it will be understood that in his absence, during the day, all of these subordinates receive orders from and report direct to the general foreman.

At the South Boston freight roundhouse the same condition exists.

Then there are the smaller roundhouses scattered over the division, eight in number. The men in charge report direct to the master mechanic. At some of them there are wipers or inspectors or both, and in others merely a man in charge with a helper or two.

On the Boston division there are also some side issues outside the locomotive work in the shape of electric power houses at Back Bay and for the Nantasket Beach branch, as well as coal dock engines at South Boston and Dover street, the men in charge of all of which report direct to the master mechanic.

Finally, there are the foreman of car repairs and an inspector at Readville. The result is a far reaching organization, but one which is closely clustered about the head, who is thus kept in touch with the details of all work on the division and in personal contact with the men, in a way that



resembles that of the general organization of which it forms a part.

OLD COLONY DIVISION.*

The Boston division is, as we have seen, the terminal, the originating division as it were, delivering trains for breaking up and distribution to many points. Of the three receiving from and delivering trains to the Boston division, the Old Colony presents, perhaps, the greatest complications. It includes practically the whole of the original Old Colony R. R., comprising the network of roads spread over all of eastern Massachusetts, the Cape Cod territory. It is arbitrarily divided into two districts, numbered 1 and 2. No. 1 is formed of all roads lying to the eastward of a line drawn northward from New Bedford to Middleboro, and thence to Mayflower Park, including the road between the two latter points. To each of these districts a road foreman of engines is assigned.

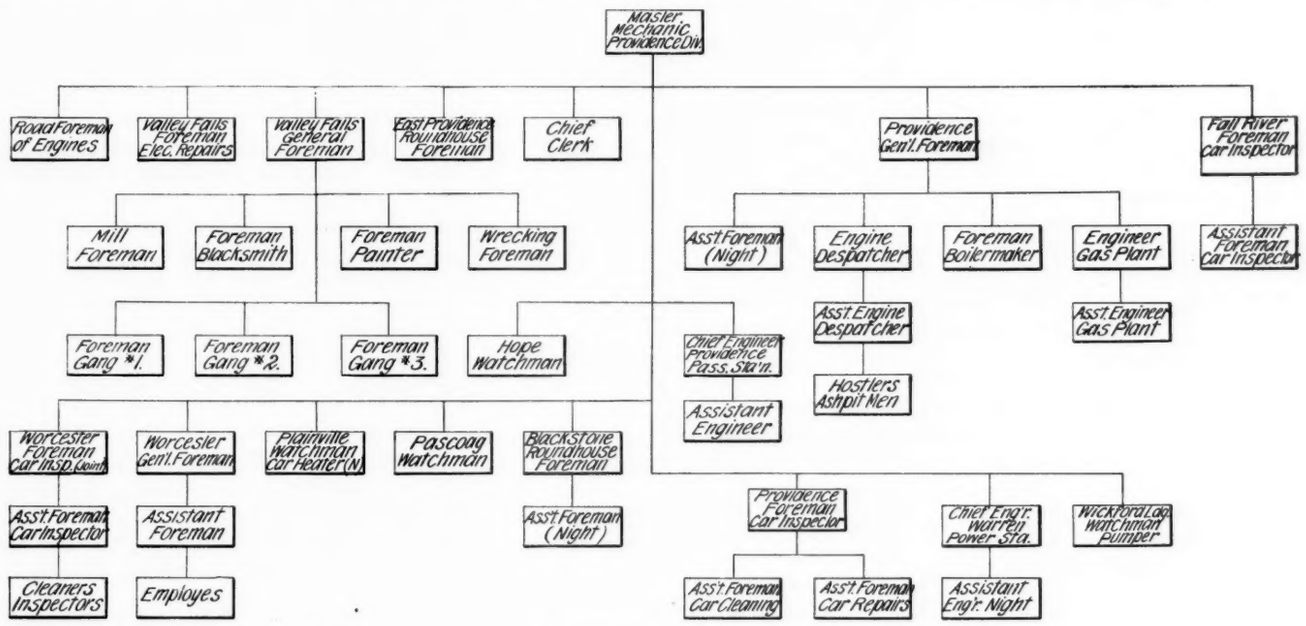
Now, while the division has a large mileage (about 460 miles) there are no large terminals and many of them are provided merely with a turntable and house where the locomotives can be sheltered for the night under the care of a watchman. For that reason, at the more distant points, these watchmen are placed under the orders of a foreman located at some other point nearby. For example, the foreman at Hyannis is in charge of the watchman at Provincetown, Chatham, Buzzards Bay and Woodshole, or the whole of the real Cape area. So the watchman at Fair Haven reports to the foreman at New Bedford, and the one at Marlboro to the foreman at So. Framingham. In looking over the diagram it will be seen that the force is meager and yet, with the exception of the cases cited, even the watchmen are next to the master mechanic.

The only shops on the division are at Taunton, and these are small. At Lowell there is no force at all. The one previously existing has been disbanded and all of the work on the New Haven locomotives is done, under agreement, by the Boston & Maine. At Taunton there is an arrangement by which all messages to the master mechanic from points on the division come through the general foreman, simply because he is always there and so acts as the representative of the master mechanic in the latter's absence.

PROVIDENCE DIVISION.

The Providence division has to provide for the heavy passenger work between New York and Boston, and is the connecting link between the Boston and Shore Line divisions. It covers a narrow strip of territory from New London to the limits of the Boston division. It is narrow and is cut by both the Old Colony and Midland dvisions which have lines passing through it. Here, owing to the density of the traffic the foremen at all points report direct to the master mechanic. There are two small shops on the division, one at Valley Falls and one at Providence. At Valley Falls all repairs are made on the electric passenger cars running on the Providence, Warren & Bristol branch between Providence & Fall River. The same thing is also done in the matter of the electrical repairs on the cars of the Nantasket Beach branch. In addition to this repairs are also made on the regular passenger and freight equipment. These electrical repairs are made under the personal supervision of the foreman of electrical repairs, who has under him a force of armature winders, machinists, inspectors and barn men.

At Providence there is a complete classification of the men employed and each checks in and out according to his work, whether machinist, boilermaker, helper, watchman or any one of the twenty-five or more classes into which the force is divided. In some of the smaller places only a night watchman is on duty, and here, as in the case of other divisions where the wachman is under a distant foreman, the station agent at the point is called upon to check the time. It will be noticed, too, that there is one drawbridge engineer reporting to the master mechanic. In this respect the practice is not uniform throughout the whole length of the system. In some cases the drawbridge engineers report to the mechanical department and, in others, to the superintendents.



Providence Division.

MIDLAND DIVISION.

The Midland division includes the territory east of the Connecticut river and west of that of the Providence division. It is a network covering nearby points with the division headquarters at East Hartford on the Connecticut river, where there are shops devoted chiefly to car repairs. The only comment needed as to its organization is to say that each gang works on all parts of the car and they are territorily separated because of local conditions.

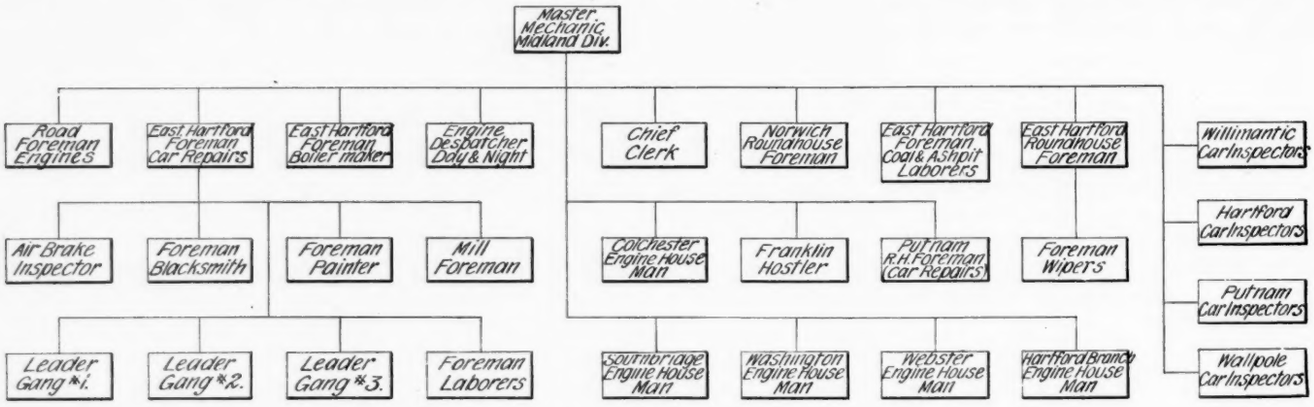
SHORE LINE DIVISION.

The arrangement of the Shore Line division more nearly coincides with that of a through line than any other division on the road with the exception of the New York. It comprises that portion of the main line between New York and

*See diagram, page 486.

Boston lying between Stamford and New London and New Haven and Springfield, together with the old Northampton division, with its extension northward to Shelburne Falls and Turner's Falls. The division headquarters are at New Haven, so that there are a number of distant outlying points that are small and which are, therefore, made subordinate to others that are larger. For example, at Westfield, Mass., there is a foreman of the engine house. North of Westfield there are the minor points of Holyoke, Northampton, Shelburne Falls and Turner's Falls. At each of these places there is an engine house watchman who reports to the foreman at Westfield.

The same holds true of the car inspector at Northampton, but the foreman car inspector at Shelburne Falls reports direct to the master mechanic. It will be seen, too, from the diagram, that all along the line there is usually an independence between foremen stationed at the same place, so that each is brought into direct contact with the master mechanic.



Midland Division.

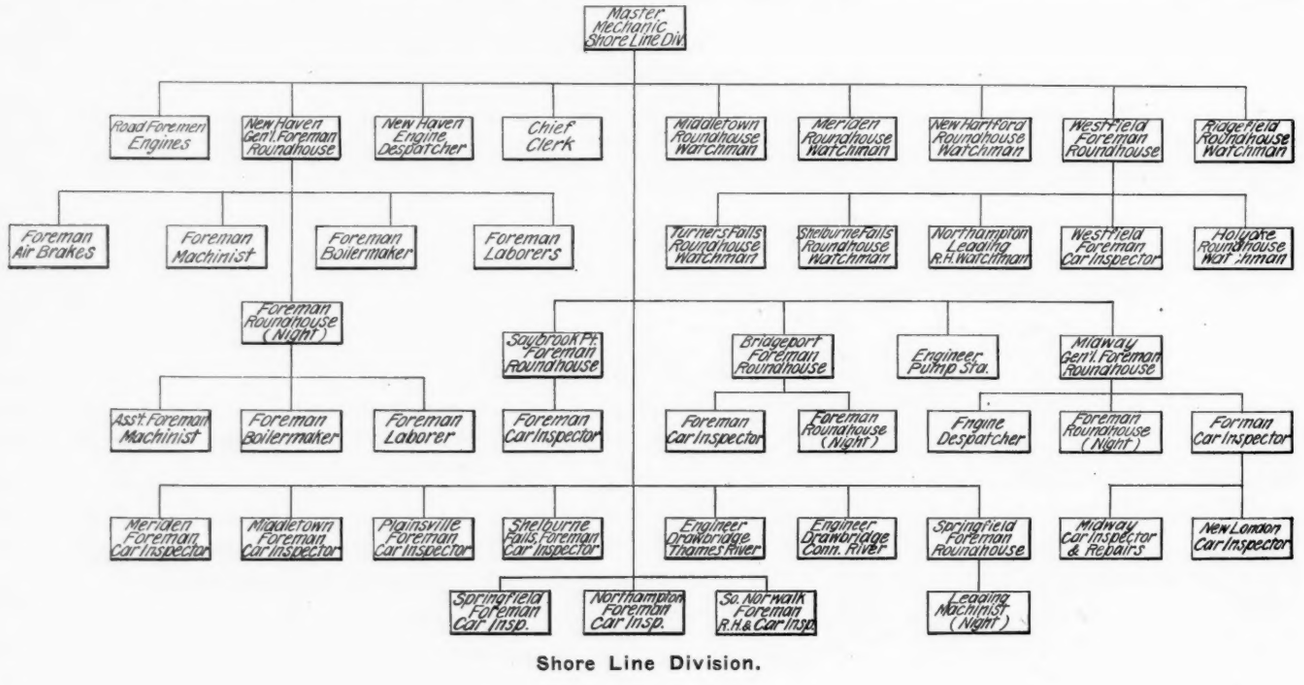
WESTERN DIVISION.

The Western division includes the territory lying to the west and north of the Shore Line division and east of the New York state line. This is also a network division, and, as will be seen from the diagram, there are a number of the smaller places where the hostler in charge of an engine house is made subordinate to a foreman at a neighboring place, while the car inspectors at the same point report direct to the master mechanic, as at State Line. In other respects the organization is identical with the other division. There are no shops other than those of the roundhouses for effecting running repairs.

It will be noticed that there is one floating watchman who apparently has no connection with the master mechanic. This man is located at Ridgefield, near Danbury, and though he is an employee of the Shore Line division, he reports to the foreman of the roundhouse at Danbury, which is on the western division. This is because of local conditions that make this the most convenient method of handling that point.

NEW YORK DIVISION.

The New York division being the simplest in its outline has also, naturally, the simplest organization. From the map it will be seen that it extends in a single line from the Grand Central station to Canaan, Conn., and from the Harlem river terminal to New Rochelle. At Stamford connection is made with the Shore Line division. There is a local passenger traffic between the Harlem river and New Rochelle that is operated with steam locomotives, and it is over this part of the division also that the through Boston-Washington trains are run. This branch is also used for all through freight trains, and large yards are maintained at Harlem river, Oak Point and Westchester. It is on the main line from the Grand Central station to Stamford that the regular through



Shore Line Division.

and local passenger traffic is maintained and which is operated with electric locomotives. There are no shops of any magnitude about the roundhouses that are fitted for light running repairs. Of these, those at the Harlem river and New Rochelle alone have to do with steam locomotives. The combination, then, of a short direct line, only 55 miles long, accounts for the simplicity of the master mechanics' organization.

ROAD FOREMAN OF ENGINES.

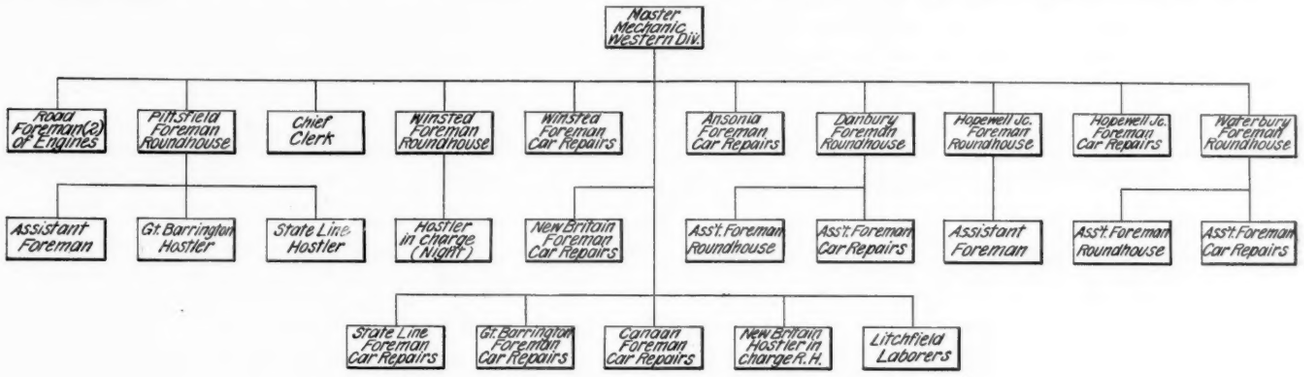
In the organization of each master mechanic's division it is the road foreman of engines who stands next to the master mechanic himself. He has authority over the general foreman of roundhouses in matters pertaining purely to the locomotive, but in nothing that has to do with the shop or its work. Yet neither of these men reports to the other. As has been repeatedly emphasized, these men, as well as others, work together in consultation and plans, and yet are quite independent.

MARINE EQUIPMENT.

The mechanical superintendent has charge also of the marine equipment of the road in New York and Boston harbors. As it owns no dry docking facilities, the organization, like that of the New York division master mechanic, is very simple. There is a chief engineer of the marine district whose position corresponds with that of the master mechanic and who is responsible to the mechanical superintendent for the proper conduct of the department. He has reporting to him a surveyor and the several foremen noted on the diagram. The surveyor's work is that of examining into all damages to the equipment, as well as that done to it by, or by it to, foreign equipment, while that of the foreman is that of caring for and maintenance of the vessels.

ELECTRICAL SUPERINTENDENT.

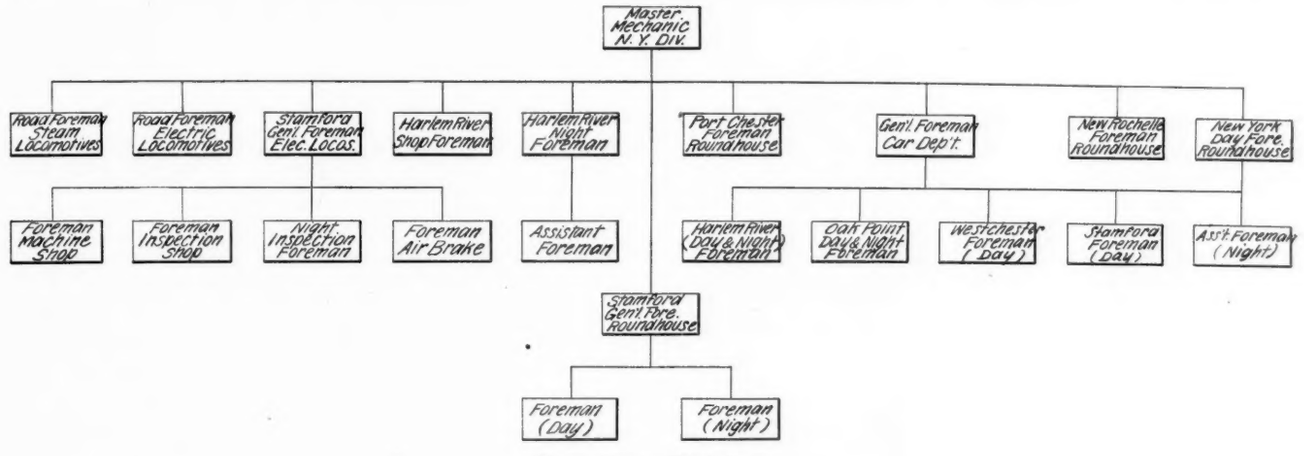
Finally there is the electrical superintendent, with headquarters at Stamford, Conn. He has charge of all matters relating to the electrical equipment, and as such has a triple responsibility, as previously noted, namely, to the superintendent on traffic matters, the engineer of maintenance of way on track and overhead construction, and the mechanical superintendent as to things mechanical. In the electrical department he has a corps of men covering the whole field; signal engineer, electrical inspector, bridge supervisor, assistant roadmaster, emergency crews, patrolmen, workmen in the repair shops, such as armature winders, air-brake inspectors, switch and battery inspectors, helpers, etc. In this group the road foreman of electric locomotives should also be placed, as he reports on things electrical to the electrical superintendent and on mechanical matters to the master mechanic of the New York division. The roundhouses on the New York division are also shown in charge of the master mechanic, so that his organization, in so far as it relates to that of the mechanical department, is confined to that of the power house, which is shown on the diagram, and is essentially that belonging to any large plant.



Western Division.

FOREMEN.

In all this it will be seen that the master mechanics are very close to their foreman. This holds not only in the matter of reports, but as to physical location as well. In each instance the office of the master mechanic is located in the yard and close to the shops or roundhouse, so that he is in constant personal touch with the men under him at headquarters, while the telephone puts him in easy communication with those at a distance, a condition that has an important bearing on the efficiency.



New York Division.

SHOP ORGANIZATIONS.

Attention will now be directed to the shop organizations, of which there are two on the system, one at New Haven, Conn., and the other at Readville, Mass. The Readville shops form a large modern establishment and it is here that the heaviest work is done. The New Haven shops are older and

not well adapted to handle the heavy present day power, so that it is only the lighter character of general repairs that are done there. It follows, from this, that there are also minor differences in the organization at the two places, as indicated on the diagrams. Each is in charge of a shop superintendent, reporting direct to the mechanical superintendent, and without having any necessary relationship with each other.

The internal organization of the two shops differ slightly from each other, as indicated on the diagrams, and will be taken up in detail. At each shop there are the locomotive and car departments, each under its own general foreman, reporting direct to the superintendent of shops.

At Readville (see diagram page 486) after the grade of foreman has been passed there are a number of men classified as gang leaders. This is an old term that has been in use upon the road for many years, and is synonymous with that of "working foremen." These leaders have charge of certain branches of the work, and on them falls the assignment of its details to the men of the gangs with which they are working and of which they are the heads.

SUB-DEPARTMENTS.

The division of the shop into sub-departments is along the lines usually employed. There are the four main divisions of the erection, smith, boiler and machine shops, each with its independent organization, and coming together in the general foreman. In the case of the erecting shop there are the foreman and the engine inspector and below them are six gangs, numbered from one to six, each with its foreman, besides the foreman of tender repairs. Each of these six gangs performs certain specific duties in the erecting of the locomotive, and each works upon every locomotive passing through the shop. In this the organization differs from that of the Roxbury shop, where a gang is competent to do all the work required on a locomotive. This is possible at that place because of the light character of the repairs done, which do

Form 5888 A.

The New York, New Haven and Hartford Railroad Company.

DAILY REPORT OF BAD ORDER CARS ON HAND AND CARS REPAIRED

At _____ 19

CARS REPAIRED 24 HOURS ENDING 6 P. M. THIS DATE.

	CLASS 1			CLASS 2			CLASS 3			CLASS 4			CLASS 5			TOTAL		
		H	F		H	F		H	F		H	F		H	F		H	F
BOX	AB			BA			CA			DA			FA			GA		
COAL	AC			BC			CB			DB			FB			GB		
FLAT	AD			BD			CD			DC			FC			GC		
BALLAST	AF			BF			CF			DF			FD			GD		
REFRIGERATOR	AG			BG			CG			DG			FG			GF		
CABOOSE	AH			BH			CH			DH			FH			GH		
TOTAL	AX			BX			CX			DX			FX			GX		

CARS ON HAND AT 6 P. M. THIS DATE.

	CLASS 1			CLASS 2			CLASS 3			CLASS 4			CLASS 5			TOTAL		
		H	F		H	F		H	F		H	F		H	F		H	F
BOX	HA			JA			KA			MA			NA			OA		
COAL	HB			JB			KB			MB			NB			OB		
FLAT	HC			JC			KC			MC			NC			OC		
BALLAST	HD			JD			KD			MD			ND			OD		
REFRIGERATOR	HF			JF			KF			MF			NF			OF		
CABOOSE	HG			JG			KG			MG			NG			OG		
TOTAL	HX			JX			KX			MX			NX			OX		

CLASSIFICATION OF FREIGHT CAR REPAIRS.

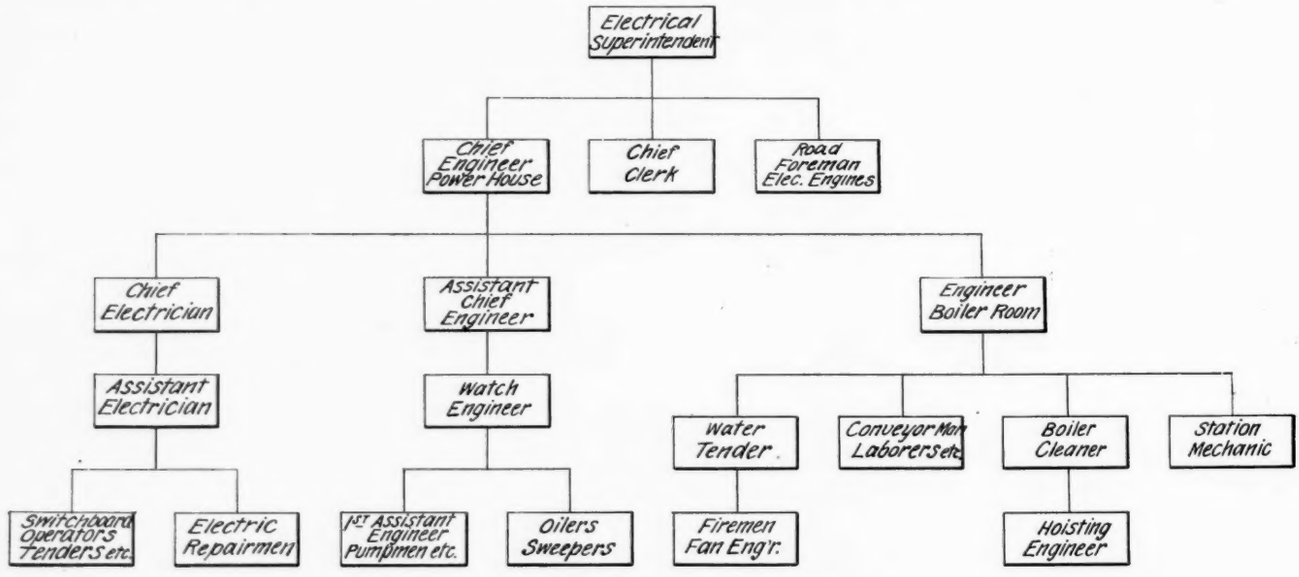
1. Includes the rebuilding of car, such as trucks repaired or rebuilt, underframing renewed or straightened and superstructure renewed.
2. Includes renewal of one or more longitudinal sills, end sills and draft timbers in conjunction with renewal of longitudinal sills, new roof in conjunction with above work and other repairs to car body or trucks. When requiring more than 36 hours and less than 72 hours labor to repair.
3. Includes either splicing of longitudinal sills, renewal of end sills, renewal of roof in conjunction with other repairs to car body and trucks. When requiring more than 20 and less than 36 hours labor to repair.
4. Includes renewal of end sills or draft timbers or body bolsters in conjunction with light repairs to roof, floor or car body and trucks. When requiring more than 10 hours and less than 20 hours labor to repair.
5. Includes the application of wheels, couplers, doors, brake rigging and other light repairs to cars. When requiring more than one hour and less than 10 hours labor to repair.
6. Includes running repairs or such repairs as can be made in yards without shifting to repair tracks.

NOTE. No. 6 Repairs not to be reported as bad order cars on hand.

Daily Report of Bad Order Cars on Hand and Repaired.

No. 5. Slight repairs to machinery such as facing valves, turning journals, etc., cost $75 to $300.

At Roxbury the repairs are limited to Nos. 4 and 5, though they occasionally creep into the No. 3. It is evident then



Electrical Superintendent's Organization.

not go beyond Nos. 4 and 5. As shown on one of the shop report forms, the repairs are classified as follows:

No. 1. New boiler and general repairs to machinery, cost $3,500 or more.

No. 2. New firebox, flues and repairs to machinery, cost $1,500 to $3,500.

No. 3. Resetting flues and repairs to machinery, cost $500 to $1,500.

No. 4. Resetting flues, turning tires and slight repairs to machinery, cost $300 to $500.

that there must be a different organization of the erecting gangs at Readville, where the heavy repairs are made. The six gangs in the erecting shop are each given a special line of work, which is classified as follows:

ERECTING SHOP GANGS.

Gang No. 1 handles the steam and dry pipes, the boiler fronts, hand-railing, sand boxes, headlights, ashpans and grates and attends to all grinding. This last item includes the steam pipes, throttle valves and all similar joints.

Gang No. 2 has the cylinders and frames. Its work in-

cludes the back cylinder heads, foot plates, frame braces and pads.

Gang No. 3 cares for the shoes, wedges and binders, the trucks, buffer beams, pilots and arch braces.

Gang No. 4 does all work on the valve motion and steam chests, handling everything from the eccentric or eccentric crank to the valve. This includes the rods, guides, crosshead and pistons with the front cylinder head.

Gang No. 5 is a stripping gang that does all of the wheeling and unwheeling.

Gang No. 6 is a cab gang, and is charged with removal and application of all boiler fittings, the safety valves, whistle, bell, injector, gages, stack and brake rigging.

Hence each gang works on every locomotive passing through the shop.

The blacksmith shop organization is exceedingly simple and is shown on the diagram. There are merely two divisions, the forge and frog shop, eacn under its own assistant foreman.

In the boiler shop a similar statement holds, there being, however, two parallel erecting gangs, each of whom has the care of 15 pits.

In the machine shop there are two assistant foremen to each of whom special duties are assigned. Assistant foreman No. 1 has charge of all work on the air-brakes, injectors, brass and bolts. No. 2 looks after ricker boxes, steam chests and valve motion. Below them are a tool-room foreman and leaders of wheel, piston, rod, brass, bolt, motion work and air-brake repair gangs.

Then there are the foremen of the minor departments, such as carpenter, painter, copper, pipe and tinsmith, laborers and watchmen, each reporting direct to and receiving orders from the general foreman.

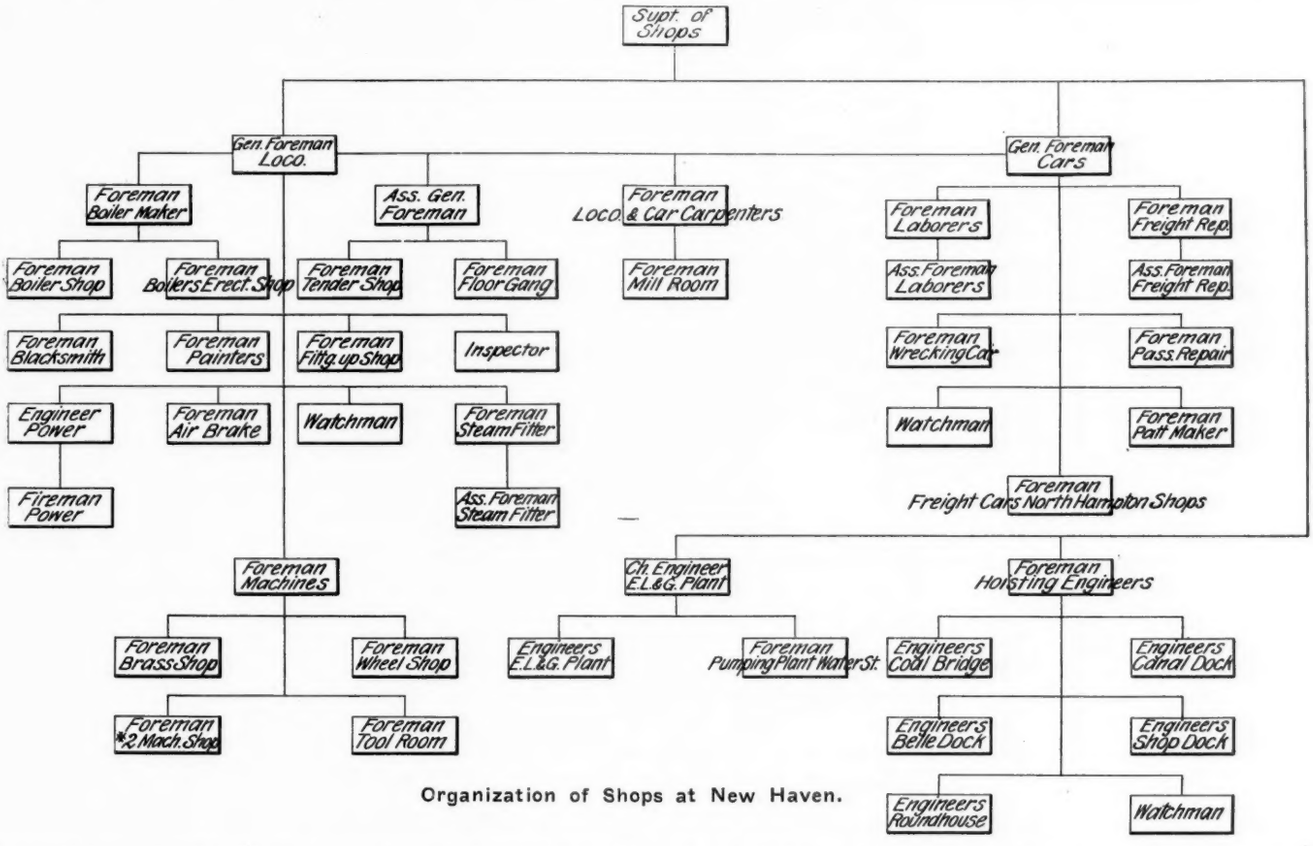
The shop demonstrator, also reporting to the general foreman, has general oversight of the apprentices and demonstrates the methods to be used to a workman who is to be trained in a special line of work.

CAR DEPARTMENT.

In the car department there is a division of the work into two parts: that relating to passenger and that relating to freight car repairs. A reference to the diagram here will show that the gang leader is very much in evidence and that in comparison with the number of sub-divisions of the work the foremen are few in number, their places being filled by the gang leaders, of whom there are many in the sub-divisions of the labor that is used. None of these leaders, however, reports direct to the general foreman, but they always reach him, in the routine execution of the work, through a foreman or assistant foreman who is in direct charge of the department.

Regular weekly meetings are held of the foremen of the shops at which the condition of the work and the needs of the several departments are discussed, and arrangements are made for taking care of future requirements. In this way the foremen are kept in touch each with the other's work, and can plan his own accordingly, so that the locomotives or cars can be turned out at the time specified.

At the New Haven shops the organization is smaller, but on the same general plan as at Readville, except that there are no leaders or working gang foremen. The foremen and assistant foremen have taken their places. These shops also include within the jurisdiction of the shop superintendent the hoisting engines and other machinery belonging to the docks and the electric lighting and gas plants. As at Readville, there is a general foreman of the locomotive and car departments, respectively, to whom the several sub-foremen report. Some of the latter have assistants. Besides the shop forces there are the electric and gas plants and the hoisting engineers, each with its own distinct organization and each reporting direct to the shop superintendent.



Organization of Shops at New Haven.

Having thus outlined the organization in its detail,

attention is now directed to the methods of its working.

LOCOMOTIVES.

The care and maintenance of the locomotives is, of course, the principal reason for its existence, and it is the efficiency in this direction that will show its strength or weakness. A railway differs from a manufacturing establishment in that it has no orders ahead. It knows nothing of future deliveries, but takes its traffic as it comes from day to day, depending upon the average to keep it in motion. As its business is but a day-to-day affair it is quite necessary that its officers should, at all times, know the exact condition of the rolling stock

Readville Shops, Jan. 18, 1910.

Mr. G. W. Wildin,
Mechanical Superintendent.

Engines in shop for repairs, awaiting repairs, etc:

Engines.	Class.	Division.	Date in Yard.	Date in Shop.	Class Rprs.	To be Out.
243	P-2	West.	1-2	1-4	3	1-28
335	K-1-B	West.	1-8	1-11	3	2-3
342	K-1-B	West.	1-7	1-7	3	1-31
762	N-3-B	Prov.	11-12	12-21	3	1-15
967	G-3	Prov.	12-24	12-24	3	1-15
1845	D-8	Prov.	12-13	12-27	3	1-17

Above engines being broken in

Engines in yard awaiting repairs:

Received.	Engines.	Class.	Division.	Repairs.
Jan. 10.....	704	N-1	Prov.	3
Jan. 4.....	730	N-2	Mid.	3
Dec. 31.....	761	N-3-B	Prov.	3
Oct. 1.....	767	N-3-B	Mid.	3
Jan. 5.....	972	G-2-C	Prov.	3
Jan. 10.....	1,532	G-3-C	Bn.	3
Jan. 10.....	1,546	G 3-C	Bn.	3
Jan. 10.....	1,644	C-1-A	Bn.	3
Jan. 8.....	1,690	C-2	Prov.	3
Jan. 5.....	1,856	D-9	Bn.	3
	10			

Engines in yard awaiting disposition (None).
Engines in yard condemned, but not removed (None).
Engines in foreign shops (None).

Engines Ordered.	Class.	Division.	Repairs.	Forwarded.
..				
..				
..				
..				
..				
..				
5				

Supt. of Shops.

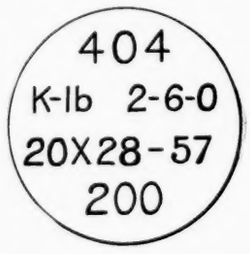
Daily Telegraphic Engine Report from Shops.

by which the business is to be handled. That the mechanical superintendent may have that information, so as to be prepared for instant action in case of an emergency as well as be able to plan ahead for future conditions a series of reports are rendered whose purpose is to keep him posted as to these essential details.

The first point upon which he must have information is the condition of the locomotives. This covers both the main shops and the roundhouses, and from each telegraphic reports are received every morning showing the numbers of locomotives and the kind of repairs that are being made. From the New Haven and Readville shops he receives a report like that shown in the blank of the Daily Telegraphic Engine report from shops. This report, which, from Readville, shows between 35 and 40 engines in the shop, with from 10 to 15 waiting entrance, is sent in duplicate to the general superintendent, the general boiler inspector, the engine despatcher at New Haven, the superintendent at Boston and to all of the division master mechanics. In addition to this a similar report "X-1" (see page 485) is received from each roundhouse where running repairs are made, so that, with the two, there is complete detailed information at hand regarding every engine on the road. These two reports are considered of the first importance and are scanned before anything else is done in the morning.

Of next importance is the report also received early in the morning giving a Statement of Engine Failures for the preceding 24 hours for each division. This is sent to the general manager, general superintendent and mechanical superintendent, and if the same engine is reported more than once for a specific failure steps are immediately taken to remedy the defect.

In addition to these reports of engines scheduled for repairs, and the failures of those in service, there is kept in the mechanical superintendent's office a complete record of the probable condition and location of every locomotive on the road. The tangible record is in the form of a large board, divided as shown in the engraving and containing a wooden plug for each engine on the system. The head of the plug shows the number and classification of the locomotive, both by the road's and the Whyte nomenclature, the size of the cylinders, the diameter of the driving wheels and the steam pressure carried. An example of the markings on one such plug is shown in an engraving. In this case it is engine 404, of the K-1b road classification; or a 2-6-0 of the Whyte nomenclature, with cylinders 20 in. in diameter and 28 in. piston stroke; the driving wheels are 63 in. in diameter and the steam pressure 200 lbs.



Pin for Locomotive Record Board.

REPORTS AND RECORDS.

The board is divided by vertical lines to correspond to the divisions, which, it will be seen, include the sub-divisions of

T 559

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY

STATEMENT OF ENGINE FAILURES.

TO { VICE PRESIDENT / GENERAL MANAGER / GENERAL SUP'T. / MECHANICAL SUP'T.

A_____DIVISION.

B_____ 19 ___

Following is report of Engine Failures and Causes for 24 Hours ending midnight.

Office to or from	Sender	Receiver	Time Transmitted M	Time Filed M

Engine C	Train D	Engineer E	TIME AT TERMINALS BEFORE STARTING Hrs. F	Min. G	Place H	Hour Left Terminal J	FAILURE REPORTED Time K	Place N	TIME LOST Hrs. Q	Mins. R	Miles Made U	CAUSE OF FAILURE V	REMARKS W

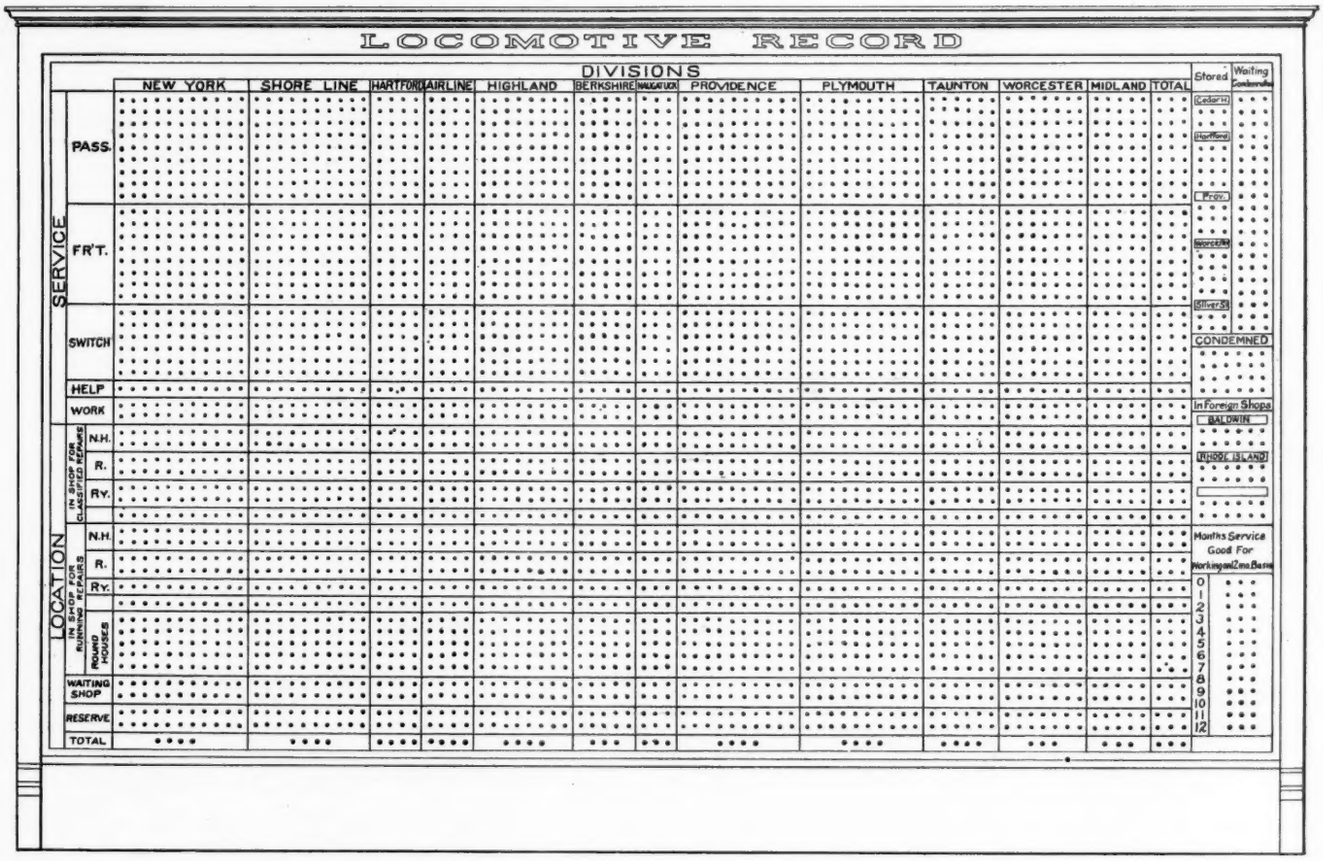
*Remarks:*_____

Daily Report of Engine Failures.

the territory covered by the jurisdiction of the master mechanics, and whose width depends upon the traffic that must be cared for. The upper half of the board is for engines in service and is divided by horizontal lines to separate the various classifications of passenger, freight, switching, helper and work. The lower half is devoted to the shops and here are indicated those engines in the shops at New Haven, Readville and Roxbury for classified and running repairs, respectively, the latter including the roundhouses. Then at the bottom are those held in reserve and waiting their turn to enter the shop, with a total of the engines assigned to each division at the bottom. At the right are holes for the plugs of stored and wornout engines, as well as those condemned. And finally in the lower right-hand corner is a space reserved for plugs carrying numerals showing the number of engines

The mechanical superintendent thus has constantly before him a record showing the location and approximate condition of every locomotive on the system, and it is from this record that the engines are sent to the shop. The master mechanics merely report on condition and the mechanical superintendent personally orders to the shop, specifying to which it shall be sent. On arrival at the shop the engines ordinarily enter in the order of their reception, but with the understanding that this rule is to be varied so as to give preference to the heavy power.

Then, too, in the making of repairs, the aim is to send the engines out well balanced for 12 months of service. For example, if it is found that the tubes might be good for six months, they are not sent out in that condition, but are renewed on the basis that it is better to incur a small extra



Locomotive Record Board in Mechanical Superintendent's Office.

that are good for the several months of service up to 12. And this refers back to the general system of shaping engines in use on the road.

When an engine is turned out after having received the No. 1, 2 or 3 classification of general repairs, it is considered to be good for 12 months of service. Its plug is put in the proper place on the board, and on its stem are two cards. These are 1⅜ in. square and the front one is red, with a white strip across the top for special notations. Where flues have been put in the red card is used. Otherwise a white one. This outside card has the lower right-hand corner clipped off showing a corresponding portion of the back card. On this corner a number is stamped corresponding to the number of months of service that should be expected from the engine. When it leaves the shop the number 12 is shown. This is changed each month, until but one month of service apparently remains before the engine must be sent in for general repairs. The locomotive is then carefully inspected in order to ascertain whether or no this time can be lengthened. If it can and it is estimated that two or three more months of service can be obtained, the card is changed.

expense at the time rather than lose the service of the engine later for flue work only.

The roundhouse repairs, too, are of the character to relieve the main shops of much extra work. For this purpose many of the houses are equipped with wheeling pits so that driving boxes can be refitted without sending the engine away. It frequently happens that two or three months' extra service can thus be obtained.

All of this information is tabulated and arranged on the basis of the daily reports that have been noted.

The passenger and freight car situation is also telegraphed in every morning from the several shops and repair yards on the forms shown. This keeps the mechanical superintendent posted as to conditions and enables him to take whatever measures may seem necessary in order to avoid congestion.

Finally, there is a daily report known as the X-4, which shows the cars on hand and the engine situation at five in the morning. This is filled out in the superintendent's office from telegraphic reports and serves as a record. Under ordinary conditions this report is only used for reference, but the moment there is danger of a shortage of power or a conges-

tion at any point it becomes of great value as a means of straightening out the situation.

The monthly reports cover the condition of the engines as well as comparisons between present and past conditions One form gives a resumé of the engines on each division and should check with the general indications of the locomotive record board in the office of the mechanical superintendent. It shows the dates of leaving the shop and of testing the boiler and staybolts; the condition of the boiler, firebox, flues, tires, machinery and the machine as a whole. To this is added a statement of the probable date of general repairs and their classification.

Readville Shops.....

Mr. G. W. Wildin,
Mechanical Superintendent,
New Haven, Conn.

Dear Sir:
Following is report of passenger cars received at shop and awaiting shop, for this date:

Received To-day.	Awaiting Shop.	In Shop.
Minor Rps.....	Minor Rps.....	Minor Rps.....
General.....	General.....	General.....

Total shop cars on hand to-day.....
Cars for running repairs received to-day.....
Cars for running repairs awaiting shop.....
Cars for running repairs in shop.....
Total .....

Yours truly,
G. DONOHUE,
Supt. of Shops.

Daily Report of Passenger Cars Awaiting Repairs.

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO.
Office of Mechanical Superintendent.
Condition of Locomotives, month ended.....1910.

		Good.	Fair.	Bad.
Boilers	This Month Last Month Year Ago			
Firebox	This Month Last Month Year Ago			
Flues	This Month Last Month Year Ago			
Tires	This Month Last Month Year Ago			
Machinery	This Month Last Month Year Ago			
General	This Month Last Month Year Ago			

Monthly Report of Condition of Engines.

to heating, steaming, leakages, breakages, etc., and is made on the form M. 199. The other enters into the matter in great detail, covering nearly every part of the engine and by divisions. This last form is the one that served as a model for that specified for use on New York railways by the public service commission. In the first especial emphasis is put upon the indication of the engine-house from which the locomotive started on the trip on which it failed and the foreman is held responsible and required to explain why he allowed it to go out in a condition where failure was apt to occur. The idea is to inculcate into the men the spirit of loyalty and team work. That it is the good of the whole road they are working for and not that of their own division alone. So

M 199

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

Engine Failures for the Month of_____19____ _____Division

INSTRUCTIONS:—Make each entry in the form of a fraction, the numerator showing character of failure—1, Heating; 2, Steam; 3, Leaking; 4, Broken; 5, Other. When Engines are out of service, indicate by "X" The denominator showing the engine house from which the engine started. Use red ink for failure in Passenger Service.

ENGINE	DATE 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total this Month	Total last Month	
TOTAL																																		
Total last month																																		
Total this month last year																																		

SIGNED BY_____

Monthly Report of Engine Failures.

ENGINE FAILURES.

Close track is also kept of all engine failures and their causes. Two reports bearing on this subject are made each month. In one the cause is specified in a general way as due

FORM T DEC

The New York, New Haven and Hartford Railroad Company.

Daily Report of Bad Order Cars on hand and Cars Repaired_____19___, _____Division.

	KIND	STATIONS	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	TOTAL H	TOTAL F
CLASS 1	BOX	AB																														
	COAL	AC																														
	FLAT	AD																														
	BALLAST	AF																														
	REFRIGERATOR	AG																														
	CABOOSE	AH																														
	TOTAL	AX																														

Daily Report of Bad Order Cars and Cars Repaired.

This form is made large enough to include cars repaired 24 hours ending 6 p. m., and cars on hand at 6 p. m. This includes under each heading the five classifications of repairs as well as the several types of cars, namely: Box, coal, flat, ballast, refrigerator and caboose, as well as totals. The report is made to cover each repair yard on each division.

Form M 173

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

MONTHLY REPORT OF CONDITION OF LOCOMOTIVES.

_____ Division, Month of _____ 190____

ENG. NO.	LOCOMOTIVES IN SERVICE.										REPAIRS.		REMARKS
	DATE LEFT SHOP RECEIVING CLASS 1 TO 4 REP.	DATE BOILER LAST TESTED	DATE STAY BOLTS LAST TESTED	CONDITION OF							MONTH WILL PROB. NEED REPAIRS	CLASS REPRS. THEN NEEDED	
				BOILER	FIRE BOX	FLUES	TIRES		MACH. GENL	LOCO. GENL.			
							WEAR IN 32's	THICK-NESS					

SUMMARY { No. in Good Cond / " " Fair / " " Bad }

NOTES CONDITION—G, denotes in good condition; F, in fair condition; B, in bad condition. Summary should be made on last sheet only and cover all locomotives reported.

To determine whether an engine should be shown as in Good, Fair or Bad Condition, the following rules must be followed.
If engine requires nothing heavier than No. 5 repairs, condition must be shown as GOOD.
If No. 4 repairs are needed within 30 days, condition must be shown as FAIR.
Engines needing heavier than No. 4 repairs must be shown as in BAD condition.
All locomotives on the Division must be reported whether assigned to the Division or not.
This report must be forwarded to the General Master Mechanic on the 24th day of each month, and MUST BE SIGNED PERSONALLY BY THE MASTER MECHANIC.

CORRECT_____
Master Mechanic.

Monthly Report of Locomotive Condition.

A 403

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

COMPARATIVE PAY ROLL STATEMENT

AND ENGINES TURNED AT_____ ROUND HOUSE WEEK ENDING_____

EMPLOYEES OF EACH CLASS	THIS WEEK		LAST WEEK		THIS WEEK LAST YEAR	
	No. Men	Amount	No. Men	Amount	No. Men	Amount
Air Brake Inspector						
Air Brake Repairers						
Yard Switchmen						
Total Pay Rolls						
DISTRIBUTION OF EXPENSES						
1. Steam Locomotives—Repairs						
2. Electric Locomotives—Repairs						
3. Other Maintenance Charges						
4. Total Maintenance Equipment						
5. Engine House Expenses—Yard						
6. Engine House Expenses—Road						
7. Other Transportation Expenses						
8. Total Transportation Expenses						
9. All Other Expenses						
10. Total Pay Roll (same as above)						
NUMBER OF ENGINES TURNED						
Freight						
Passenger						
Switch						
Total						
Average Cost per Engine Turned						
Repairs—Item 4						
Transportation—Item 8						
Total Cost per Engine						

NOTE 1.—A locomotive will be considered as turned when it leaves the turntable, coal track or water plug for its train, or the yard, or transfers light to some other point on the line.

NOTE 2.—Number of employees shown should be based on the total hours worked by that class of labor, divided by nine or the working hours of the roundhouse for any particular class of labor, so as to get number of employees working full time.

Weekly Report of Cost of Engine Turning.

Includes also the following employees:

Air-brake repairers' helpers
Ashpit men
Blacksmiths
Blacksmiths' helpers
Boilermakers
Boilermakers' helpers
Boiler washers
Brakemen
Clerks
Carpenters
Carpenters' helpers
Callers
Engine checkers
Engine despatchers
Engine-house men
Engine inspectors
Engine preparers
Front-end inspectors
Flue cleaners
Fire cleaners
Foremen
Fuel handlers
Hostlers
Headlight men
Hoisting engineers
Handy men
Laborers
Locomotive crane operators
Machinists
Machinists' helpers
Oilers
Painters
Painters' helpers
Pipers
Pipers' helpers
Pumpers
Stationary engineers
Stationary firemen
Steam-heat men
Sparkers
Sand dryers
Tinsmiths
Tinsmiths' helpers
Telegraph operators
Tool checkers
Tank repairers
Tool-room men
Turntable men
Water tenders
Wipers
Watchmen

T 364 A
"X-4 REPORT"

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

Report of cars on hand and engine situation at 5.00 A. M. Operation report for the 24 hours ending midnight ______ 19

WESTBOUND — EASTBOUND

	Engines				Received				Forwarded				Cars on Hand					Division		Cars on Hand				Forwarded				Received				Engines				Switching Service			Weather	
	Boarded	Ready for Service	In Sight to Turn	In for Light Repairs	Trains	Loaded	Empty	Total	Trains	Loaded	Empty	Total	Through Loads	Local Loads	Empty	Total		Terminal		Through Loads	Local Loads	Empty	Total	Trains	Loaded	Empty	Total	Trains	Loaded	Empty	Total	Boarded	Ready for Service	In Sight to Turn	In for Light Repairs	Engines in Use	No. of Shifts	No. of Crew Hours		
	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RM	RN	RO	RP	RS				A	B	C	D	E	F	G	H	I	J	K	M	N	O	P	Q	R	S	T		
DA																		Midway																						DA
DB																	DA	Shore Line Div.	DA																					DB
DC																	DB	Providence Div	DB																					DC
DD																	DC	Midland Div.	DC																					DD
																	DD	Total	DD																					
DE																		Providence																						DE
DF																	DE	Shore Line Div. 1st Dist.	DE																					DF
DG																	DF	" " " 2nd Dist.	DF																					DG
DH																	DG	Midland Div. 3rd Dist.	DG																					DH
DI																	DH	Old Colony Division	DH																					DI
																	DI	Total	DI																					
DJ																		Worcester																						DJ
DK																	DJ	Providence Division	DJ																					DK
DL																	DK	Midland Division	DK																					DL
DM																	DL	Boston & Maine R. R.	DL																					DM
DN																	DM	Boston & Albany R. R.	DM																					DN
																	DN	Total	DN																					

Providence Div.

"BS" BOAT SERVICE. Days Worked.						"BM" BOAT MOVEMENTS To and From Connections		No. of Steamers	Loaded Short of Capacity		No. of Floats	Loaded Short of Capacity		Delayed at Foreign Bridges	
		No.	Days	Hours	Mins.				East	West		East	West	Hours	Mins.
*STEAMERS		A	B	C	D			A	B	C	D	E	F	G	H
Maryland	WA					Penna. R. R.	WF								
Express	WB					L. V. R. R.	WG								
Company Tugs	WC					C. R. R. of N. J.	WH								
Outside Tugs	WD					L. I. R. R.	W								
Total	WE					Total	W								

"MS" HARLEM RIVER. Misc. Cars					
Classified Cars, East	SA		Shop Cars	SG	
Unclassified Cars, East	SB		Transfer Cars	SH	
Total	SC		Cars Transferred	SI	
Classified Cars, West	SD		Transfer Cars Left Over	SJ	
Unclassified Cars, West	SE		Company Coal	SK	
Total	SF		Other Co. Freight	SM	

"HG" HARLEM RIVER. Hold Grain					"OG" HOPEWELL. Hold Grain		
Location		On Hand	Forwarded	Ordered Out	On Hand	Forwarded	Ordered Out
		A	B	C	A	B	C
Harlem River	SN						
Oak Point	SO						
Westchester	SP						
Total	SQ						

* FLOATS AND STEAMERS

This report must be prepared and forwarded promptly to the Division Offices and to the General Office, "NH" so that it will reach the latter office not later than 7.00 A. M. The signals "X-3" and "X-4" will have preference over all signals excepting "Train Order Signal, "95" and "97."

Cars on Hand and Engine Situation at 5 a. m.

The points listed under Division Terminal on this form include also five points in the East Providence district, and a total of 25 points in the Mansfield, Taunton, Middleboro, South Framingham, South Boston, East Hartford, Willimantic and Putnam districts, omitted here.

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY

DETENTION TO TRAINS DUE TO ELECTRIC LOCOMOTIVE FAILURES DURING MONTH OF ______ 19 ______

DIVISIONS	HEATING: Armature Bearings	Driving Boxes	Truck Boxes	Other Bearings	TOTAL	BROKEN: Air Pipes	Axles	Frame Bolts	Other Bolts	Couplers	Coupler Knuckles	Draft Gear	Equalizers	Equalizer Pins	Other Pins	Driving Springs	Other Springs	Spring Hangers	Shoes—3rd Rail	Tires	Trolleys—A. C.	Trolleys—D. C.	Truck Frame	Wheels	Other Breakages	TOTAL
NEW YORK																										
TOTAL																										
TOTAL LAST MO.																										
TOTAL THIS MO. LAST YEAR																										

DIVISIONS	GROUNDED: Change Over Switch	Circuit Breaker—A. C.	Circuit Breaker—D. C.	Main Motor	Main Motor Leads	Preventive Coils	Resistance	Switch Groups	Transformers	Trolleys—A. C.	Trolleys—D. C.	Wiring—H. T.	Wiring—L. T.	Wiring Control	Other Grounds	TOTAL
NEW YORK																
TOTAL																
TOTAL LAST MO.																
TOTAL THIS MO. LAST YEAR																

DIVISIONS	MISCELLANEOUS: Brake Equipment	Blowers	Compressors	Hot Switches	Loose Contacts	Control	Loose Tires	Loose Wheels	Magnet Valves	No Sand	Hose—Air	Hose—Signal	Hose—Steam	Hose—D'ble H'd'g	Hose—Control	Whistle	Steam Heat	Heavy Train	Weak Batteries	Loose Controller Plug	3rd Rail Shoe Operation	Careless Engineer	Shoe Fuses	Jumpers	Sanders	Loose Bolts & Nuts	Other Causes	TOTAL	TOTAL	Total Last Mo.	Total This Mo. Last Year	Eng. Miles Per. Failure	Minutes Detention Per Failure
NEW YORK																																	
TOTAL																																	
TOTAL LAST MO.																																	
TOTAL THIS MO. LAST YEAR																																	

that if an engine is received in one division roundhouse that belongs in another, and repairs are found to be necessary for satisfactory operation, they are to be made then and there regardless of who may be responsible for the general maintenance of the machine.

In connection with the reports on engine failures there are two (Forms T. 418 and M. 145) that must be filled out by each crew working a train that is delayed and sent to the master mechanic of the division on which is occurs. Form T. 416 must be signed by both the conductor and engineer, so that they thus express an agreement as to the cause. Form M. 145 must be made out by the engineer, and in it he reports on the detail of the mechanical defects only that were the cause of the failure.

M 150 THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

REPORT OF INTERIOR EXAMINATION AND REPAIRS TO BOILERS

ENG NO._____ SHOP_____ DATE_____190

No.	PARTS EXAMINED	CONDITION FOUND	REPAIRS MADE
1	WHEN BOILER WAS BUILT		
2	BUILDER		
3	BACK HEAD		
4	R. SIDE SHEET		
5	L. SIDE SHEET		
6	THROAT SHEET		
7	ROOF SHEET		
8	DOME		
9	CONNECTION OR GUSSET SHEET		
10	BARREL OF BOILER		
11	SMOKE BOX		
12	EX. FRONT		
13	FIRE BOX NEW OR OLD		
14	DOOR SHEET		
15	R. SIDE SHEET		
16	L. SIDE SHEET		
17	FLUE SHEET		
18	CROWN SHEET		
19	STAY BOLTS		
20	MUD RING		
21	FRONT FLUE SHEET		
22	FRONT FLUE SHEET BRACE		
23	BACK HEAD BRACE		
24	CROW BAR BRACE		
25	DOME BRACE		
26	CROSS BRACE		
27	SLING STAYS		
28	CROW FEET OR TEES		
29	RIVET SEAMS		
30	NO. OF FLUES IN BOILER		
31	LENGTH OF FLUES		
32	NO. RESET		
33	NEW OR PIECED		
34	GRATES PAT NOS.		
35	GRATES BAR PAT NOS. R. & L.		
36	ASH PAN		
37	TENDER TOP		
38	TENDER BOTTOM		
39	R. SIDE		
40	L. SIDE		
41	BACK		
42	COPING		
43	COAL SPACE R. & L. SIDE		
44	THROAT SHEET		
45	FRONT END R. & L.		

*Boiler Washed*_____ *Date*_____ *190*_____ *Signed*_____ *Inspector*
*Boiler Tested*_____ *Lbs. Date*_____ *190*_____ *Signed*_____ *Foreman*
*Steam Pressure Allowed*_____ *Lbs.*_____ *Correct*_____ *M.M.*

Report of Individual Boiler Inspection.

TURNING ENGINES.

Finally, there are weekly reports from each roundhouse showing the cost of turning engines at that point. This is a

NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY.
Office of Mechanical Superintendent.
Engines in service week ending 190

Division	Class of repairs required 1 2 3 4	Total Requiring Repairs	Total in Service
New York.....			
Shore Line.....		—	
Western.....			
Midland.....			
Providence.....			
Old Colony.....			
Boston.....			
Total.....			
Total last week			

Weekly Report of Engines in Service.

T 658

"X-I REPORT"

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

_____Shops,_____19

To_____

ENGINES IN SHOP FOR REPAIRS

Engine No.	Date Received at Shop	When to be Ready for Service	NATURE OF REPAIRS
(A)	(B)	(C)	(D)

(E)_____
Master Mechanic.

Roundhouse Repairs.

M 145
THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.
Detention Report Division
Date of Report Date of Failure 19
Train No. Engine No.

Detained at	Hour	Min.	Cause of Detention
			For additional space, use other side.

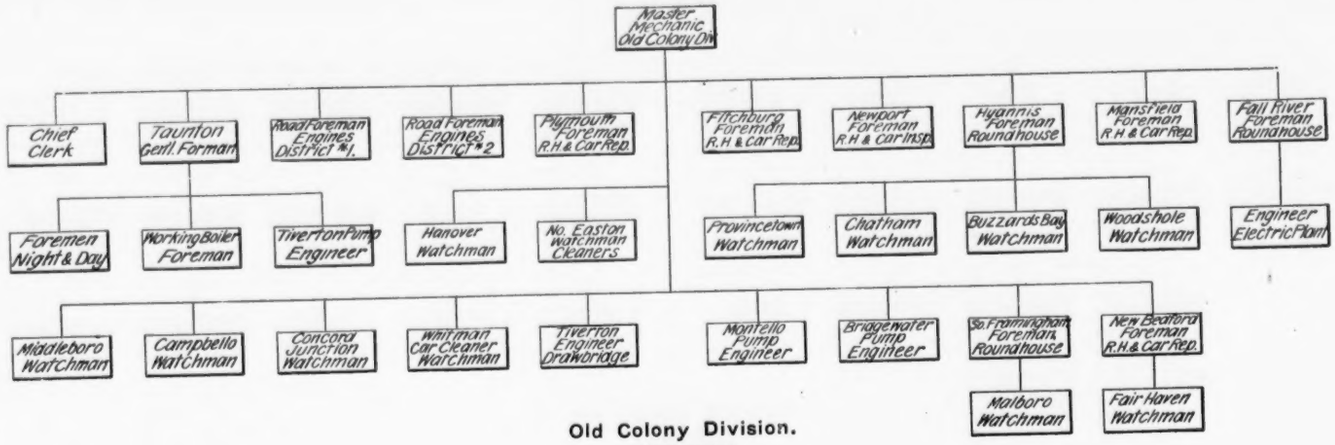
Engineman Fireman

Enginemen will fill out this report at the end of each trip, giving cause and full particulars of all mechanical failures; depositing same in a box provided for the purpose.

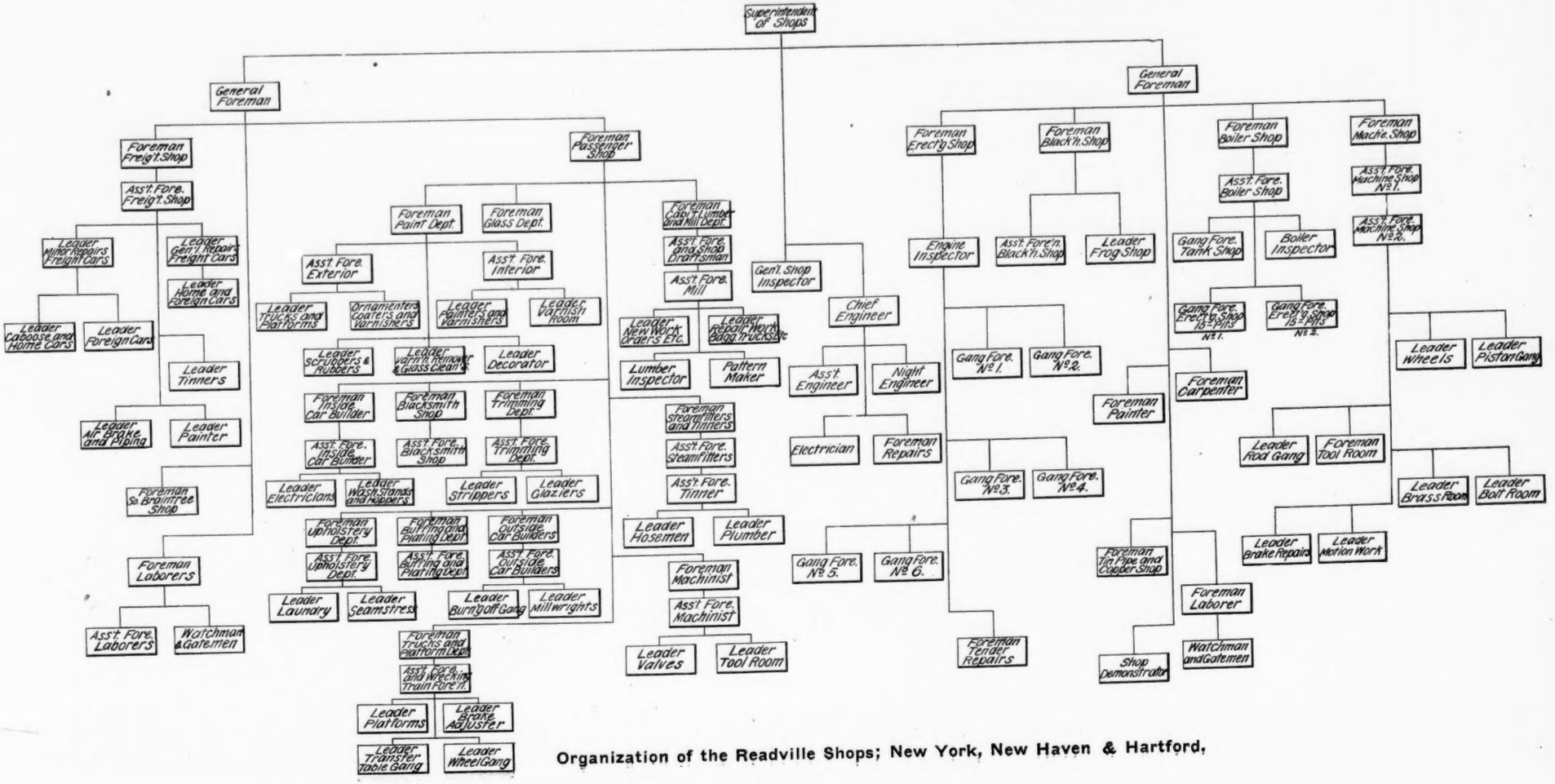
M 144.
Loco. No.....
.....19.....
Station Date
Boiler Tested.....19.....
Sta. Date
Lagging removed.....19.....
Sta. Date
Stay bolts tested.....19.....
Sta. Date
.....Broken .....Renewed.
Boiler washed, steam gage tested, gage cocks and water glass cocks cleaned .....19.....
Sta. Date
Safety valves tested and set to pop at .....lbs. .....lbs. .....lbs.
Hydrostatic pressure applied.....lbs.
Signature .....
Inspector.
Drawbar and pins.....

M 144
THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD CO.
Loco. No..... .....19.....
Station Date
Boiler tested..... .....19.....
Station Date
Lagging removed..... .....19.....
Station Date
Stay bolts tested..... .....19.....
Station Date
Boiler washed, steam gage tested, gage cocks and water glass cocks cleaned.. ....19.....
Station Date
Safety valves tested and set to pop at.....lbs .....lbs .....lbs
Hydrostatic pressure applied.....lbs
Signature .....
Inspector.
Correct .....
Master Mechanic.
Drawbar pins.....

Boiler Inspection Certificate.



Old Colony Division.



Organization of the Readville Shops; New York, New Haven & Hartford.

modification of the payroll and shows the time worked by each class of workman and the wages paid. The expenses are distributed under ten heads, as well as itemized in detail. The list includes all classes of labor that may be employed in and about a roundhouse, though, of course, no house has them all and most of them but a small percentage. These figures are of no value so far as comparisons between the different houses on the system are concerned, but do serve to check up the operations of each house with itself from month to month and week to week.

BOILER REPORTS.

There is one more class of reports that are of great importance. They are those of the general boiler inspector, to whose duties allusion has already been made. One comes in the usual form of a diagram illustrative of the broken staybolts that inspector may have disclosed and which is not reproduced, as it is duplicated on nearly every road. A second is that of the interior inspection (M. 150) made at the shop, and which enters into the minute details of the condition. The third is the card certificate that is required to be made out once a month for all engines running into New York state by the public service commission.

The reports, then, bear out the general plan of the mechanical organization, of simplicity and a reduction in number. The weekly and monthly reports are records upon which the broad policy of the management may be based, while the daily telegraphic reports are those upon which action depends and which indicate what should be done at once. They are part of the working of the plan by which the mechanical superintendent is brought into close touch with his subordinates and the work that they are doing, and thus neutralize the effect of the non-resident overlord who might be so burdened with executive duties that he would fail to know what is going on and gradually becomes enmeshed in a mass of red tape; a condition that does not exist here.

For this exposition of what is being done acknowledgment must be made to George W. Wildin, the mechanical superintendent, through whose courtesy and that of his assistants the data upon which it is based was collected.

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.

DETENTION TO TRAINS DUE TO ENGINE FAILURES DURING MONTH OF__________190___

DIVISIONS	HEATING								STEAM					
	Driving Boxes	Truck Boxes	Tender Boxes	Eccentrics	Rod Pins	Pins & Valve Gear	Other Bearings	TOTAL	Poor Coal	Poor Firing	Flues Stopped Up	Foaming	Other Causes	TOTAL
New York														
Shore Line														
Western														
Midland														
Providence														
Old Colony														
Boston														
TOTAL														
Total Last Mo.														
Total This Month Last Year														

DIVISIONS	LEAKING											
	Flues	Firebox	Throttle	Piston Packing	Piston Rod Packing	Steam Pipes	Steam Chest Valve	Arch Tubes	Exhaust Pipe	Blowoff Cock	Other Leakages	TOTAL
New York												
Shore Line												
Western												
Midland												
Providence												
Old Colony												
Boston												
TOTAL												
Total Last Mo.												
Total This Month Last Year												

DIVISIONS	BROKEN																																	
	Eccentric	Eccentric Strap	Eccentric Blade	Rocker Arm	Guides	Guide Blocks	Main Rod	Side Rod	Crank Pins	Other Pins	Piston Rod	Piston Head	Follower or Bolts	Valve Yoke	Valve Rod	Cylinder Head Front	Cylinder Head Back	Steam Chest	Glands or Gland Studs	Driving Springs	Truck Springs	Tender Truck Springs	Spring Hanger	Equalizer & Bolts	Frame	Frame Bolts	Other Bolts	Crosshead	Axles	Tires	Wheels	Arch Coming Down	Other Breakages	TOTAL
New York																																		
Shore Line																																		
Western																																		
Midland																																		
Providence																																		
Old Colony																																		
Boston																																		
TOTAL																																		
Total Last Mo.																																		
Total This Month Last Year																																		

DIVISIONS	MISCELLANEOUS																																	
	Air Pump	Other Brake Arrangement	Air Hose	Signal Hose	Steam Heat Hose	Injector	Lubricator	Sander	Whistle	Check Valve	Safety Valve	Relief Valve	Steam Heat	Cylinder Cock	Blower	Water Scoop	Grates	Front End Filling Up	Front End Arrangement	Burst Flue	Draft Gear	Coupler	Coupler Knuckle	Eccentric Slipping	Loose Tire	Loose Wheel	Loose Bolts or Nuts	No Sand	No Water	Heavy Train	Freight Eng. on Pass. Train	Careless Engineer	Other Causes	TOTAL
New York																																		
Shore Line																																		
Western																																		
Midland																																		
Providence																																		
Old Colony																																		
Boston																																		
TOTAL																																		
Total Last Mo.																																		
Total This Month Last Year																																		

DIVISIONS	TOTAL	TOTAL LAST MONTH	TOTAL THIS MONTH LAST YEAR	Eng. Miles per Failure
New York				
Shore Line				
Western				
Midland				
Providence				
Old Colony				
Boston				
TOTAL				
Total Last Mo.				
Total This Month Last Year				

UPPER LINE DENOTES PASSENGER
LOWER LINE DENOTES TOTAL PASSENGER AND FREIGHT

OFFICE OF MECHANICAL SUPERINTENDENT
NEW HAVEN, CONN.,   190

Engine Failures.

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO.
Office of Mechanical Superintendent.
Engines out of service week ended............19

Class Repairs.	Waiting Shop.						In Shop.						Total						Repaired During Week.					
	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total	1	2	3	4	5	Total
New Haven................																								
E. Hartford..............																								
Taunton..................																								
Readville................																								
So. Boston...............																								
Roxbury..................																								
Total....................																								
Total last week..........																								
Increase.................																								
Decrease.................																								

No. 1—New boiler and general repairs to machinery..........$3,500 or more
No. 2—New fire box, flues and repairs to machinery..........1,500 to $3,500
No. 3—Resetting flues and repairs to machinery..........500 to 1,500
No. 4—Resetting flues, turning tires and slight repairs to machinery..........300 to 500
No. 5—Slight repairs to machinery, such as facing valves, turning journals, etc..........75 to 300
Aggregate tractive power out of service week ended............
Aggregate tractive power out of service week ended............

Weekly Report of Engines Out of Service.

AMBITION AND ZEAL AMONG RAILWAY EMPLOYEES.*

There comes a time during the existence of every human being with normal mind when an ambition is awakened within him. In some it is merely an "air castle" or mental longing without the manifestation of zeal to achieve; in others it arouses an unconquerable will power to push forward—discouragement is impossible because the energy is from within and not supplied by the stimulus of some outside influence. In the former it must be vitalized and fostered by encouragement on the part of some other individual—generally somebody who is in a position to reward the efforts put forth in pecuniary advancement, and in some of these the ambition dies out as soon as the outside influence ceases.

It appears to me that the bulk of the young men which it is possible to employ on a railway belong to the former class. In my traveling I visit much with the trainmen, enginemen and other employees. Being one of the rank and file, I have a better chance to hear their real opinions than do officers.

*From a paper by H. R. Newlean, secretary to the General Superintendent, Union Pacific Railroad, Omaha, read before the annual meeting of officers of the road, September, 1909.

The most widespread complaint is that their relations with the officials amount largely to "nothing said when all goes well; discharge or condemnation when mistakes are made." Therefore, many of them feel that they are whipped into doing right rather than encouraged to do so through the channel that most men prefer to be appealed to—their intellect. Of course, the men are being paid amply for loyal service, but a fixed salary buys only a fixed amount of work and loyalty.

It is not necessary in thus appealing to the men that they should be impressed with the idea of a possible superintendency or general managership awaiting them. Why does the small boy work with such zeal when his teacher picks him out as monitor, or so diligently apply himself after school hours, giving up his outdoor play, when she asks him to stay and help her? It is because his pride is stirred. It is not because he ever expects or wants to govern the school room. Why does a man who has been attending club meetings for years in a disinterested fashion suddenly develop great zeal and interest when he is delegated to serve on a committee or as an officer of that club? It is because his mental usefulness has been recognized; it is not because he is expecting any financial gain or particular glorification.

If an employee goes along every day doing his work to the entire satisfaction of an official and sufficiently well to merit his pay check, the lack of punishment should not be the only indication of your appreciation of him—he should occasionally be discreetly commended; he should be acknowledged as a competent force in the operation of the road and made to feel that he is such.

The craving for fame and the plaudits of our judges is a potent factor in all human nature. Turn where you will, the successful official, who inspires voluntary zeal on the part of his men and is loved of them, is the one who recognizes this trait of human character—not the one who expects to secure discipline through strenuous coercion. The fear of discharge does not deter many of the younger employees from doing wrong things after they have become belittled with the seeming unimportance of themselves. Frank intercourse between officials and employees has wrought wonderful results in the right direction.

The fact is often bemoaned on large railways that the employees are not as loyal as they were twenty or thirty years ago, or rather when the railways were in their constructive period and the number of employees small. Has there been a radical change in the characteristics of humanity, or is it because the family of employees has become so large that the men have lost their identity? Is it not a fact that when a man is thus swallowed into the ranks of an army of fifteen thousand workers, his ambition is deadened by the comparative oblivion into which he is forced? Was he not, during the constructive period, a vital necessity to his employers; was he not called upon by his superiors, as well as by the primitiveness of the railways over which he operated, to use his brain power and ingenuity more; was it not that which maintained his interest? Is it not the routine of his present occupation and virtual loss of individuality that is exterminating personal zeal?

In the United States the day has passed when men are ruled by fear of their employers, although they do more or less surrender their independence to presumed injustices when a wave of commercial inactivity sweeps the country and creates a dearth of positions. The control of man has passed through three phases; he was once controlled by superstitious fear; then by the fear of absolute power; to-day his continued loyalty and employment is largely dependent upon his own satisfaction with the position occupied and with the employer. He was once loyal to the individual from whom he got his daily bread. With jobs plentiful he can pick and choose and conduct himself quite independently. If fear does not create loyalty, what does?

I mention kindliness last, not that it is by any means least, but to emphasize its absolute essentiality to all successful endeavor to call forth from mankind the best it possesses. Its pervading influence stands out clearly wherever there is contentment, loyalty and zeal. Kindliness should be the prevailing and first principle of discipline. If this in itself will not bring about the desired results a judicious amount of sternness added may, but anyone who is habitually abusive and uncongenial will always wind up his career as an unsuccessful disciplinarian. . . Slason Thompson, in his report for the year 1908, said:

"A study of accident statistics shows that their control is a matter of men. We have been multiplying laws and regulations and have been neglecting the obvious training and discipline of the only force that has the remedy for accidents literally and figuratively in its hands. And by discipline here is meant, not the discipline that punishes and penalizes, but the discipline that instructs, perfects and rewards competence, obedience and automatic vigilance."

T 418

The New York, New Haven & Hartford Railroad Co.

CONDUCTOR'S AND ENGINEMAN'S JOINT REPORT.

_____ 19____

*Train*_____

*Left*_____ *at*_____ *M.*

*Arrived*_____ *at*_____ *M.*

*Engine*_____

*Conductor*_____

*Engineman*_____

*Total Cars*_____

*Loaded Cars Handled*_____

Empty " " _____

Special " " _____

Through " _____

*Through Passsengers*_____

*Signals from*_____ *to*_____

*Causes of Delays*_____

_____

_____

_____

_____

_____

_____

_____

_____ *Conductor*

_____ *Engineman*

Conductors of all trains leaving and arriving at any terminal station, will fill out this blank and leave it in telegraph office for transmission to the Superintendent's Office. If any delays occur, the causes must be agreed to and this report personally signed by both the Conductor and Engineman, and a copy promptly forwarded to both the Superintendent and Master Mechanic of the division on which the delays occur.

Conductor's and Engineman's Joint Report.

Russian press despatches say that a regulation has been issued by the minister of communications which provides for the payment of one rouble (50 cents) per day for food to each first and second-class passenger during delays to passenger trains resulting from snow storms, floods or any kind of accident. Third-class passengers receive 50 kopecks (25 cents) and fourth-class passengers and emigrants 40 kopecks (20 cents). Children are paid one-half.

Shop Kinks.

NINETEENTH COLLECTION (FIRST PRIZE.)

BY ELMO N. OWEN,
General Foreman; Southern Pacific, Bakersfield, Cal.

ADJUSTABLE FOOT FOR BAR.

In Fig. 1 is shown an adjustable foot to be used with a bar as indicated in the drawing. This device is very convenient for roundhouse work, and it is used continually by

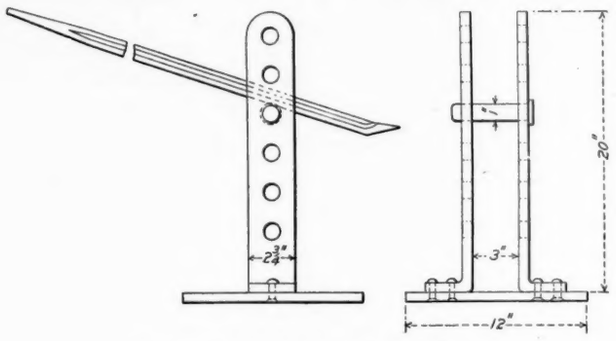


Fig. 1—Adjustable Foot for Bar.

the man who works on brake rigging. It overcomes the necessity of, and loss of time in, hunting for blocks. Being adjustable for different heights, it is particularly advantageous for a large variety of work, such as putting up shoes and wedges.

PORTABLE FORGE.

The portable forge shown in Fig. 2 is designed for the use of a blacksmith when working on small parts in the erecting

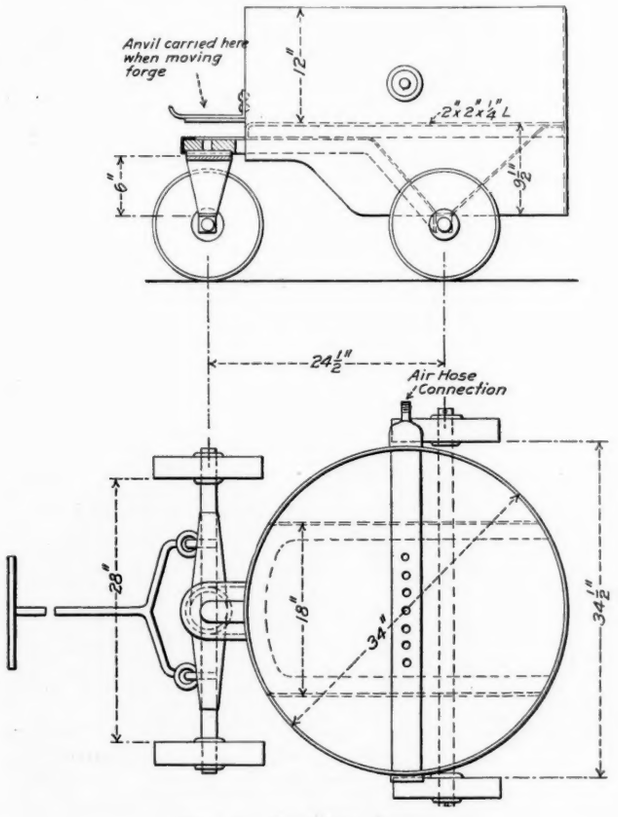


Fig. 2—Portable Forge.

shop, such as setting running board brackets. Otherwise it is necessary to head these pieces in the blacksmith shop and carrying them, hot, to the erecting shop. An anvil is carried on the bracket shown, but is placed upon the floor when being used.

CHECK AND BRANCH PIPE JOINT REAMER.

In Fig. 3 are shown the details and in Fig. 4 an assembled view of a device for reaming the joints of a branch pipe or injector check ball joints. These joints often become so damaged that it is necessary to machine them, and

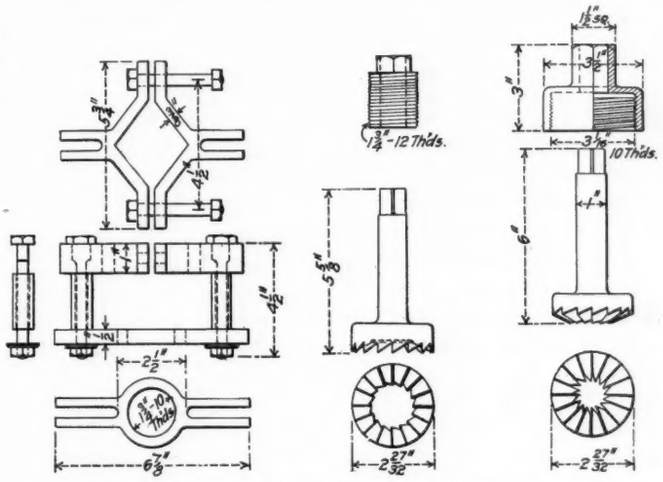


Fig. 3—Details of Check and Branch Pipe Joint Reamer.

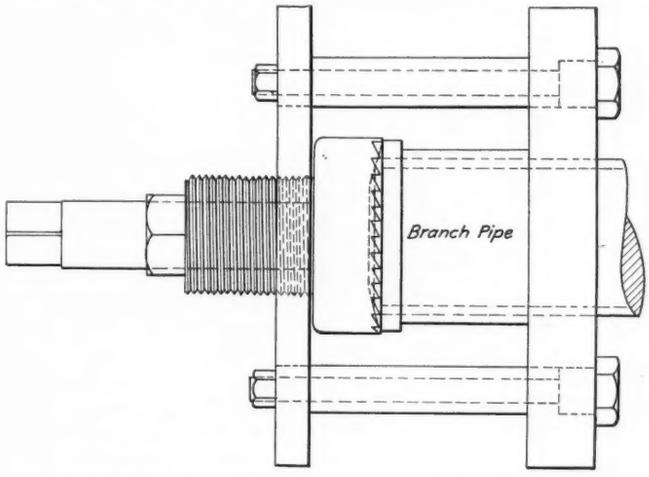


Fig. 4—Assembled View of Check and Branch Pipe Joint Reamer.

this device was designed by Fred Benz, tool room foreman at Bakersfield, so that these joints could be repaired without removing the check or pipes from the locomotive. The assembled view shows the device in place on a branch pipe.

PORTABLE ROUNDHOUSE BENCH.

In Fig. 5 is shown a portable bench, designed for use in the roundhouse. The top is covered with a sheet of No. 16 iron and a vise is secured to the end as indicated. The 20-in. x 20-in. x 5-in. drawer is sufficiently large to carry all small tools required, while larger ones are placed on the inside of

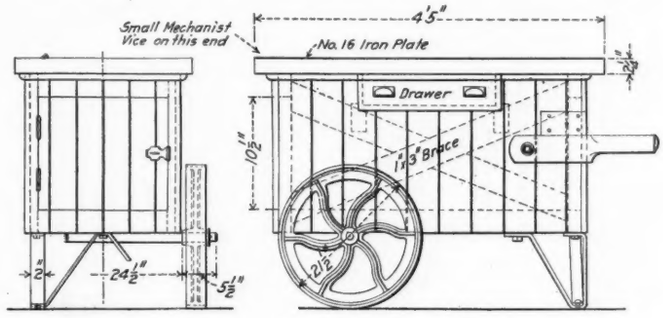


Fig. 5—Portable Roundhouse Bench.

the bench itself. This bench will be found a very handy and time-saving device by machinists in the roundhouse.

TWENTIETH COLLECTION (SECOND PRIZE.)

BY WM. G. REYER,
General Foreman; Nashville, Chattanooga & St. Louis, Nashville, Tenn.
Collection Signed also by J. W. Hooten, Foreman Repair Work.

VALVE STRIP CHUCK.

The line cut, Fig. 6, shows a simple chuck for clamping slide valve balance strips for planing. The strip is clamped, as shown, so as to counteract, as much as possible, any tendency to spring. The hook-shaped clamps grip the ends of the strip and are tightened by the nuts on the under side. This chuck is very light and easily made.

TOOL HOLDER FOR PLANING VALVE STRIPS.

The sketch shown in Fig. 7 is of a three-bar tool holder for use on a planer with the chuck shown in Fig. 6. Two cutters may be used for the roughing cut only, machining both sides of the strip simultaneously. One set of cutters may be used for the finishing cut only with which to maintain a standard size of strip. The tool holder is fastened to the plate of the clapper box by a bolt, and either set of cutters may be revolved in position quickly. This tool is a labor-saver and does very accurate work.

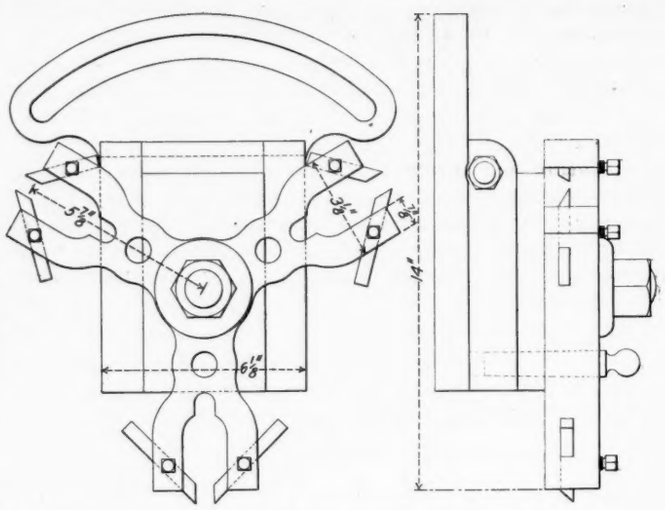


Fig. 7—Tool Holder for Planing Valve Strips.

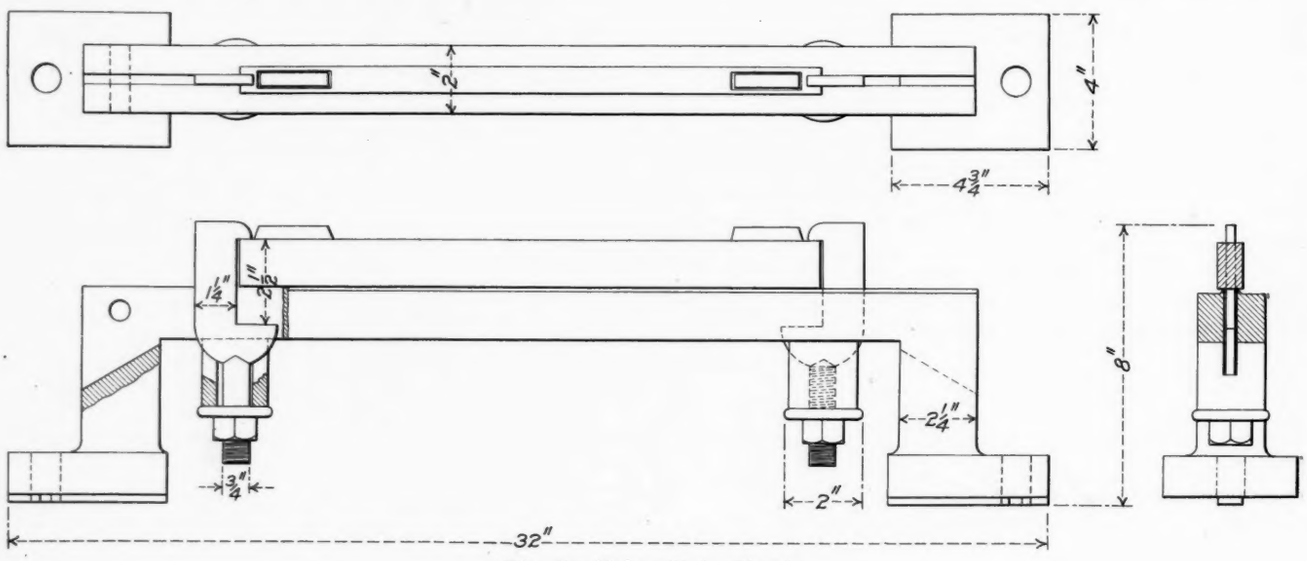


Fig. 6—Valve Strip Chuck.

BOLT MACHINE ATTACHMENTS.

The half-tone illustration, Fig. 8, shows three very useful

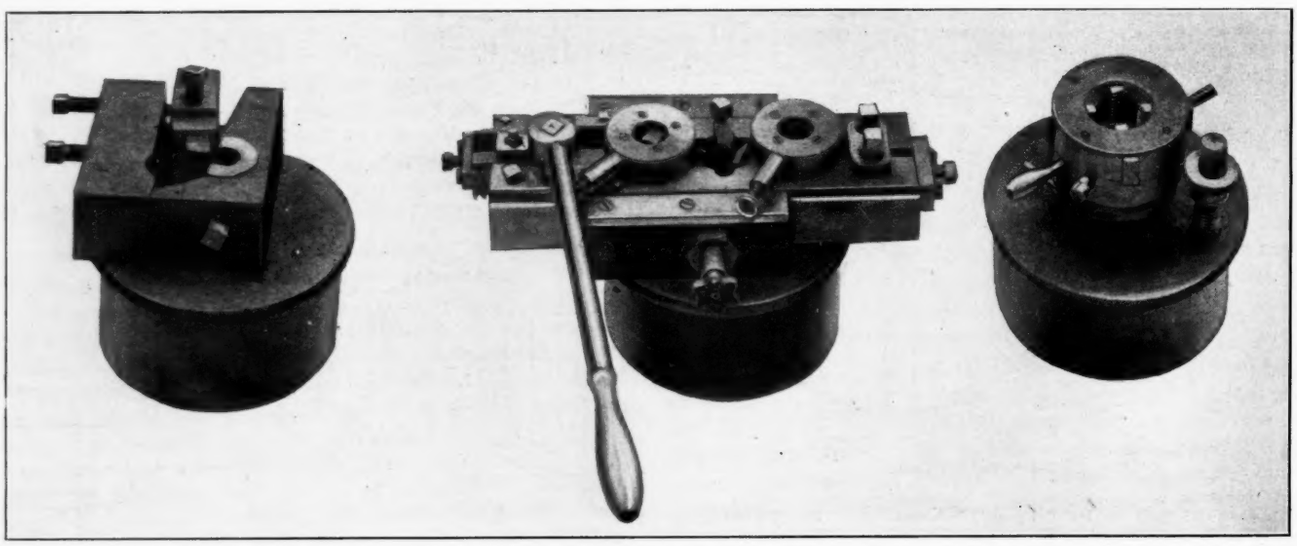


Fig. 8—Bolt Machine Attachments.

labor-saving attachments for use on a four-spindle Lassiter bolt machine. The attachment to the left of the illustration is used for roughing cuts or turning straight bolts. The attachment in the center is used for cutting off taper or straight bolts, and the hollow mill shown in the center is used for sizing bolts for threading. The attachment to the left is used for pointing and turning teats on the ends of bolts. The dies are tripped from the under side by the thumb screw shown and can be adjusted for any length of thread.

With these attachments, bolts are handled direct from the heading machine, requiring no centering. These attachments are also adapted for use on a drill press.

PLANER TOOL HOLDER.

The line cut, Fig. 9, shows a double planer tool holder for machining the inside faces of the flanges of shoes and

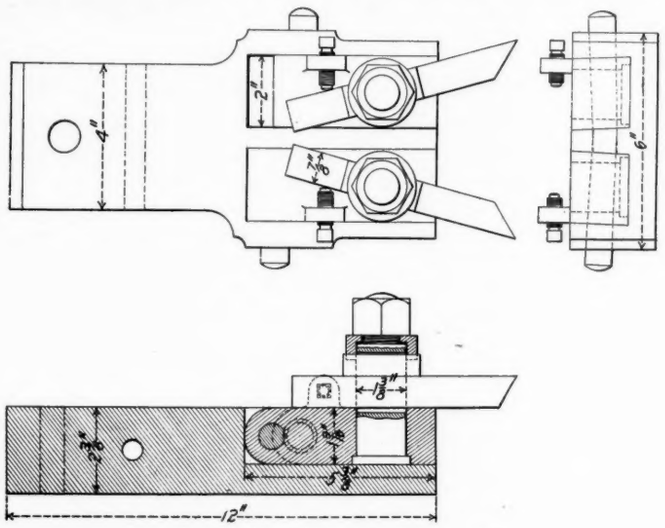


Fig. 9—Planer Tool Holder.

wedges, driving boxes, cross-head gibs, etc. The tools are inserted through slots in the bolts and drawn down tightly against the clapper plates and adjusted by small set screws.

TWENTY-FIRST COLLECTION.

BY W. H. SNYDER,
Asst. Gen'l Foreman; N. Y., Susquehanna & Western, Stroudsburg, Pa.

DEVICE FOR COMPRESSING PISTON PACKING RINGS.

The accompanying line drawing, Fig. 10, shows a very handy device for compressing packing rings in a solid piston head while applying it to the cylinder. Ordinary wedges, the tang of a file, etc., are often used for this work. This device is placed around the piston head and over the rings and tightened up by the small key and latch, which latter acts as a ratchet to mesh in the lock and hold the band tightly. The band is made of No. 16 sheet iron, 3 in. wide. The lugs shown prevent it from slipping into the cylinder. In using, the band is tightened until the rings are flushed with a piston head, and as it passes into the cylinder the band is pushed off by the lugs.

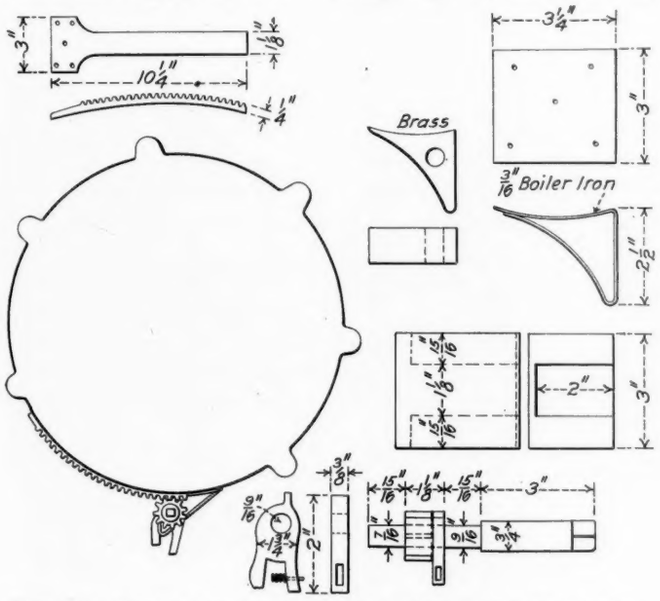


Fig. 10—Device for Compressing Piston Packing Rings.

PATCH BOLT COUNTER-SINK.

The illustration, Fig. 11, shows a very useful patch bolt counter-sink for boiler work, and one which has been successfully used in the New York, Susquehanna & Western shops at Stroudsburg, Pa., for a number of years. The stud, which acts as a guide, is screwed into the tapped hole in the boiler

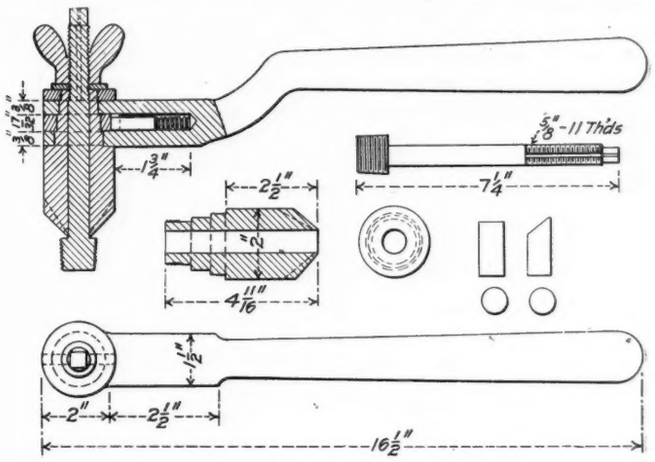


Fig. 11—Patch Bolt Counter-sink.

sheet. The cutter is then slipped over the stud and the counter-sink for the patch bolt is made square with the tapped hole. The cutters are fitted into the sheet by tightening the two winged nuts. Several different sizes of studs, to suit the various patch bolts, are carried in stock, such as ⅛-in., ⅞-in., ⅛-in. and 1-in. After using this tool the counter-sink of the patch bolt will make a perfect fit and will draw down square with the tapped hole.

DEVICE FOR APPLYING FIRE HOSE COUPLINGS.

A device for applying fire hose couplings to hose is shown in Fig. 12. The nut or sleeve is first screwed on and adjusted. Two sleeves of different length are required, as the two couplings of fire hose are not the same length. After the sleeve has been adjusted the expanding nut is slipped into position and the threaded end of the pin run into place. The

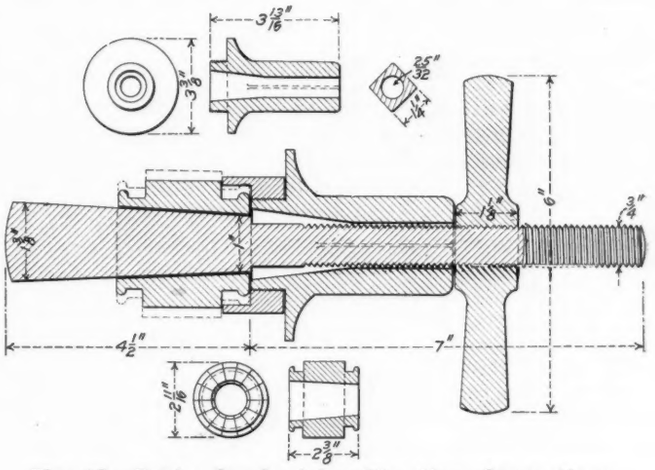


Fig. 12—Device for Applying Fire Hose Connections.

brass ferrule is then placed into the hose and expanded by screwing up on the nut.

HEAVY DUTY BORING BAR.

The accompanying drawing, Fig. 13, shows a boring bar for heavy duty, used for boring and slotting locomotive driving wheels on a 90-in. Niles boring mill, having a slotter attachment. A feature of this bar is in the clamp at the bottom

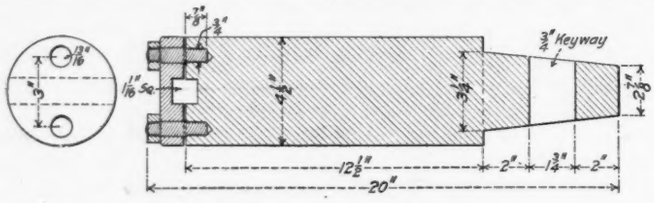


Fig. 13—Heavy Duty Boring Bar.

which secures the tool. This clamp, or bottom plate, has two ¾-in. studs running through it, which provides for securely holding the tool much more firmly than is possible with a set screw. It is also possible to make the square slot between the two pieces easier than making a square hole through the end of a solid bar.

CROWN BEARING ANGLE PLATE.

A very useful angle plate for slotting the edges of driving box brasses is shown in Fig. 14. The V of this angle plate insures the brass being machined square with the turned crown. In those shops which have not better facilities for

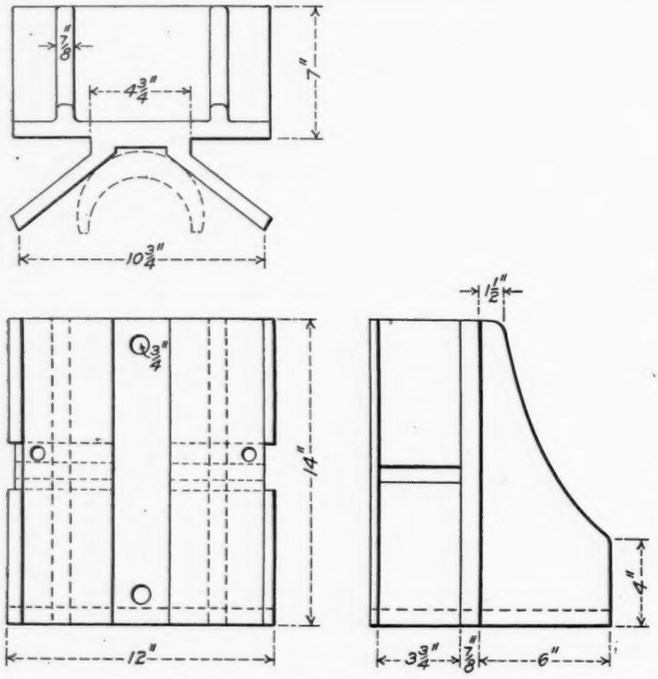


Fig. 14—Crown Bearing Angle Plate.

machining crown bearings, this angle plate will be found to be a very handy device for use on a slotter or a lathe. When used on a lathe an ordinary angle plate is bolted across the carriage to which the angle plate here shown is fastened.

TWENTY-SECOND COLLECTION.

BY C. C. LEECH,
Foreman, Pennsylvania Railroad, Buffalo, N. Y.

PACKING RING MANDREL.

The mandrel shown in Fig. 15 is designed for use on a lathe for turning brass or metallic piston rod packing rings. The mandrel A has a shoulder against which the part B bears, being shrunk on. This part is also tapered as shown to receive the cone C, which is driven against the end of the cutters, causing them to move out against the packing ring. The six jaws are held in place by the plate F, which is bolted to the face by six screw-head bolts. This chuck is designed to take different sizes of jaws, the travel being only ½-in. If desired, this chuck can be made so as to fit into the sleeve

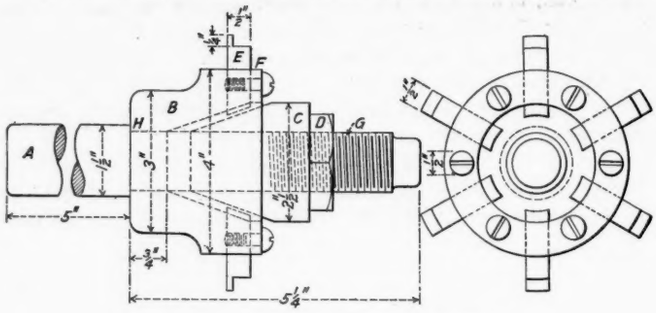


Fig. 15—Packing Ring Mandrel.

of the live center of the lathe, which makes a carrying dog unnecessary. This same chuck may be used for turning steam pipe joint rings, by having a set of long jaws.

ADJUSTABLE BORING TOOL.

The tapered end of this tool, Fig. 16, is made to fit the sleeve in the lathe tail stock. A ⅜-in x 1-in. slot receives the two cutters, which are held in position by the plate, secured by screw-head bolts. These cutters are adjusted by the fluted

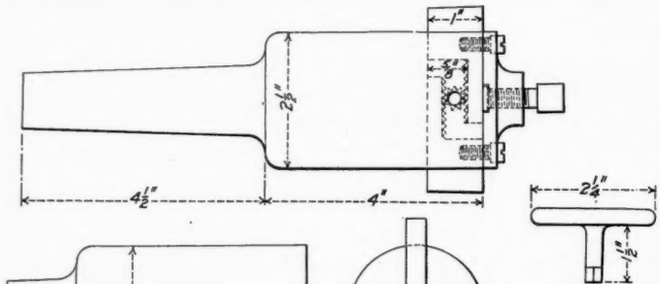


Fig. 16—Adjustable Boring Tool.

section of the spindle, operated by a small wrench. After the required adjustment is obtained the cutters are secured in position by the set screw shown. The cutters are made of tool steel and the body of the tool of soft steel.

PISTON PULLER.

A simple but effective piston puller is shown in Fig. 17. The main block is made to conform to the taper of the pin fit in a crosshead, and has a tapered slot planed through it to receive the key. The block, which bears against the end of

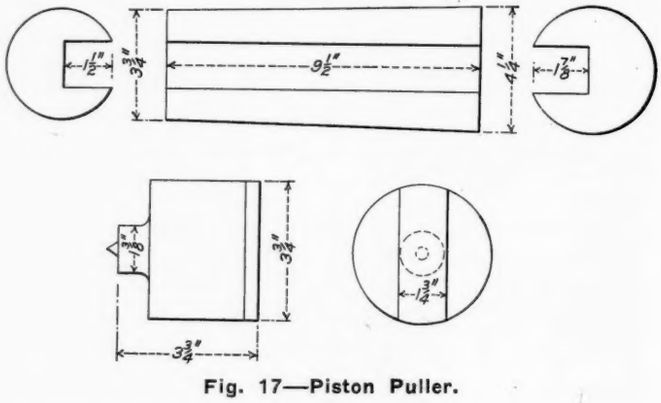


Fig. 17—Piston Puller.

the piston rod, has a round boss in the center on one end and a tapered tongue on the other. This tongue extends into the slot of the pin portion and is tapered to correspond to the key.

SUCTION CLEANER.

A simple arrangement for cleaning car seats, cushions, carpets, etc., is shown in the accompanying line cut, Fig. 18. Air, at about 75 lbs. pressure, is admitted as indicated, and is directed along the hose to cause a suction at the nozzle which is held on the seat or carpet. The nozzle is made of galvanized iron and has an opening ⅛-in. x 6-in. The 1¼-in. pipe coupling is soldered to it, making a permanent joint and preventing the entrance of air. An ordinary globe valve, with its interior partitions removed, is used as a three-way connection, through which air is run into the pipe. The right angle

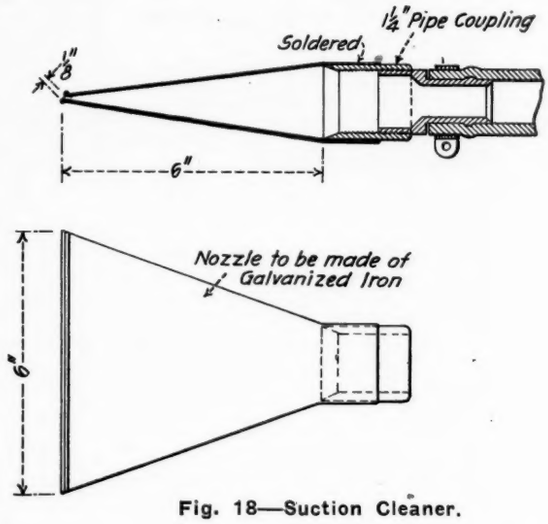


Fig. 18—Suction Cleaner.

jet has five 7/64-in. round holes through which the air passes.

CHUCK FOR DRILL PRESS USE.

Fig. 19 shows a handy chuck for using square shank taps or reamers on a drill press. The body A is bored out to receive the collet C, which has a square opening to fit over the top of the reamer or tap. A set of these collets should be

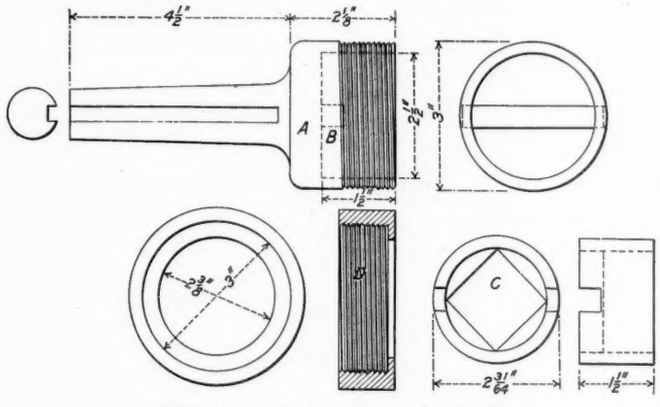


Fig. 19—Chuck for Drill Press.

made having squares ranging from ¾ in. to 1½ in. After placing the collet in the retaining collar D, it is screwed on to the body, clamping the collet firmly. The dowel pin, indicated at B, prevents turning. The collets are made of tool steel, the other parts of soft steel.

TOOL FOR MACHINING SOLID SIDE ROD OIL CUPS.

This tool, Fig. 20, is designed for use on the boring bar of a horizontal milling machine for finishing solid side rod oil cups. The tool is held on the bar by a ½-in. x ¼-in. key. The arm of the tool has a 1-in. slot cut through it on an

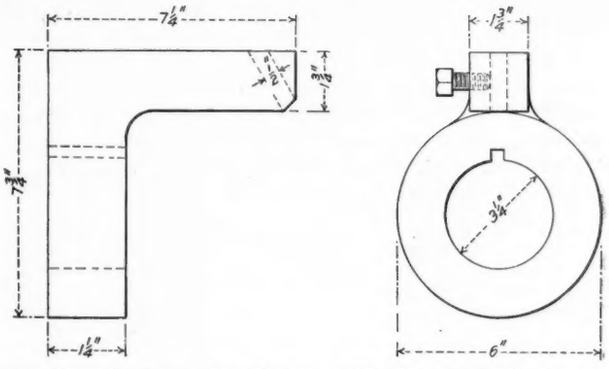
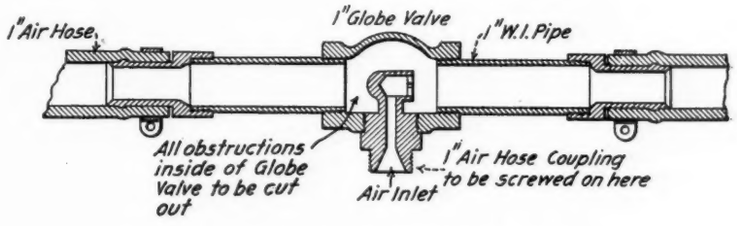


Fig. 20—Tool for Machining Solid Side Rod Oil Cups.



angle in which the cutter is held by the set screw. After the outside of the cup is finished a counterbore and the tap are used on the inside. These tools have shanks to fit the ends of the boring bar. By this method it is possible to complete the work on an oil cup at one setting of the rod.

WHEEL LATHE DRIVER.

The driver shown in the accompanying sketch, Fig. 21, is designed for use in turning steel tired or roller steel wheels. The bracket part A is made of cast iron and securely bolted to the face plate of the lathe. Part B, made of steel, and containing the toothed steel dog and key, is securely bolted to the cast iron portion of the driver. The dog is driven

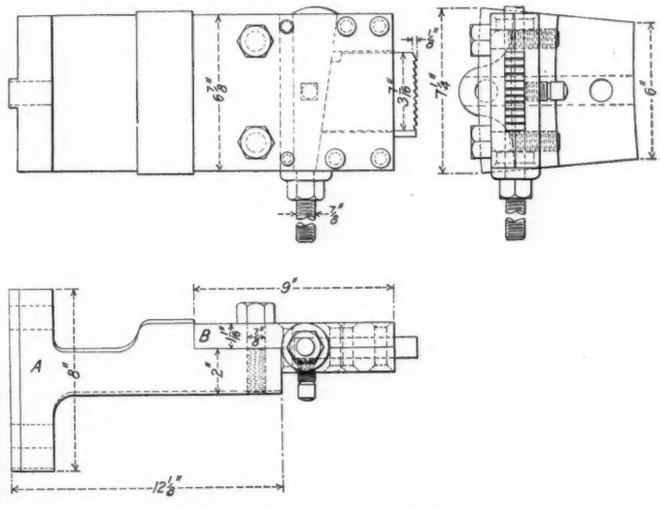


Fig. 21—Wheel Lathe Driver.

against the rim of the wheel by the key, which is drawn against the back of the dog by the nut shown. Six of these drivers constitute a set, three for each wheel.

SLOTTER TOOL BAR.

The slotter tool bar, shown herewith, Fig. 22, is made of soft steel, 24 in. long. The lower end, which holds the tool, is made 2¾ in. square and slotted to receive the movable block in which the tool steel cutter is held. This block moves on the ⅜-in. pin shown. When making the downward, or cutting, movement the steel spring holds the block in position, but on the upward, or return, stroke the block takes the posi-

tion indicated by the dotted lines. This relieves the cutting edge of the tool, which ordinarily drags against the work on the upward stroke.

BRACE AND REAMER FOR RESEATING INSIDE BOILER CHECKS.

The device, Fig. 23, shows a very effective method for reseating inside boiler checks. The brace, made of 1¼-in. x 1¾-in. soft steel, is clamped in a bench vice. The boiler check body, shown dotted, is then fastened to the brace

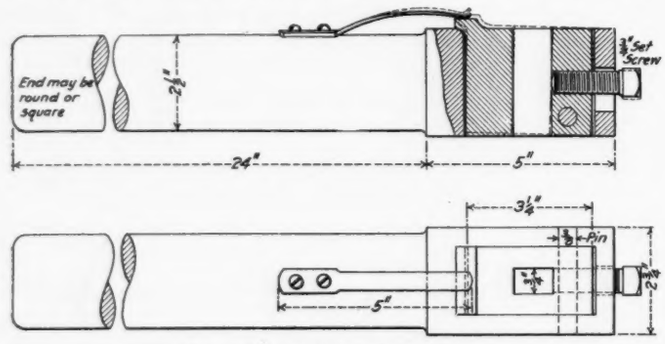


Fig. 22—Slotter Tool Bar.

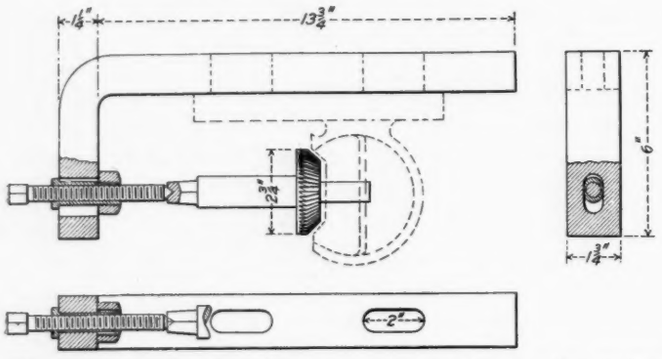


Fig. 23—Brace and Reamer for Reseating Inside Boiler Checks.

through holes in the casting and the slots in the brace. The tool steel reamer is then put in position and adjusted by the screw, which is later clamped in position by the lock nut. The slotted hole seen in the elevation allows for the vertical adjustment. The reamer is then revolved by using an ordinary wrench.

TWENTY-THIRD COLLECTION.

BY E. J. M'KERNAN,
Tool Supervisor; Atchison, Topeka & Santa Fe, Topeka, Kan.

HYDRAULIC PRESS FOR ROD WORK.

In the accompanying line cut, Fig. 24, is shown a hand-operated hydraulic press for rod work. This press is capable of exerting a pressure of 25 tons, and is especially adapted to all rod work for pressing in and removing bushings, for

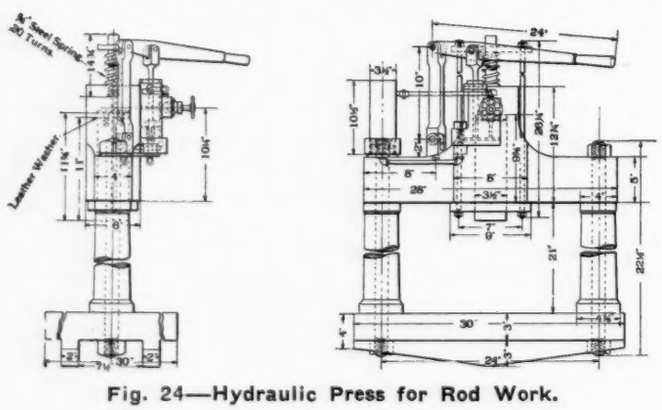


Fig. 24—Hydraulic Press for Rod Work.

applying driving box brasses, etc. For rapid heavy work this press is far superior to the hand screw press ordinarily used. It occupies a very small space as compared with the usual design of press, and owing to the rapidity with which it works, it is an especially desirable roundhouse appliance. It may be built of ordinary material found about a locomotive shop and at a very reasonable cost.

FLUE-CUTTING MACHINE.

The illustration, Fig. 25, shows very clearly the construction of a machine for cutting off the ends of flues. It does not differ greatly from other machines used for this work, although it does show a very efficient arrangement. A 6-in.

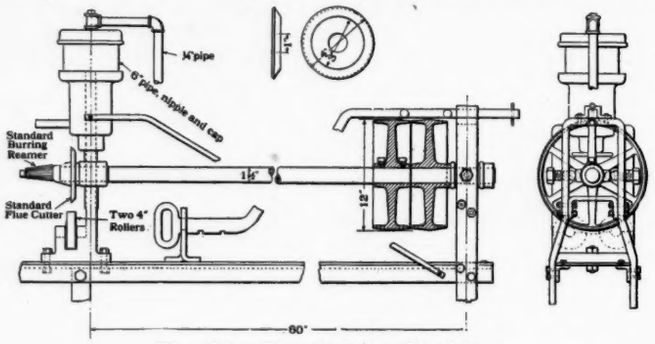
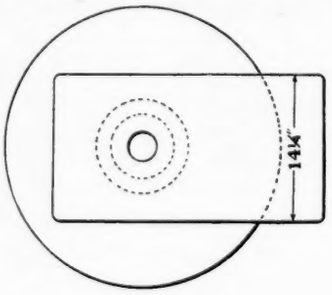


Fig. 25—Flue-Cutting Machine.

air cylinder operates the cutter, which is mounted on a 1½-in. shaft. On the end of this shaft is placed a high speed reamer, used for removing the burrs or for tapering the ends of the flue for welding. The belt shifter is placed in a handy position, the handle being located as shown in the sketch.

ROUNDHOUSE VISE STAND.

A vise stand for roundhouse use is shown in Fig. 26. It is made of cast iron and of a suitable size for placing between



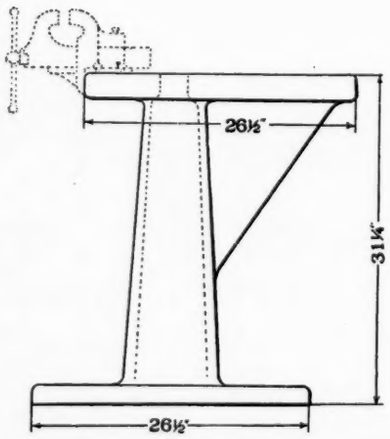


Fig. 26—Roundhouse Vise Stand.

or at the ends of the pits. This bench is especially useful for roundhouse work, and much more convenient than a wooden bench placed against the wall. It occupies very little space, and at the same time is very rigid and more substantial than

any form of wooden bench. The top may be used for straightening bolts, rods, etc., and the design of base provides no place for scrap material to accumulate.

KNUCKLE AND WRIST PIN CHUCKS.

Slightly different designs of chucks for turning knuckle and wrist pins are shown in Fig. 27. They are designed for screwing on the main spindle of the lathe, and are notched, as shown, to facilitate removing by the use of a block and hammer. The outer end of the casting is threaded

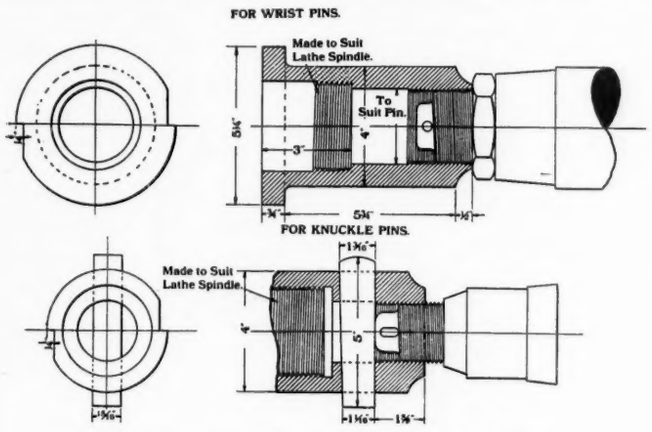
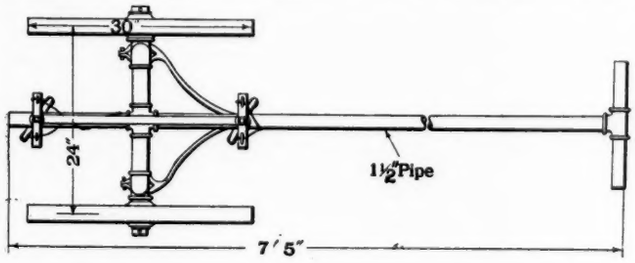


Fig. 27—Knuckle and Wrist Pin Chucks.

to correspond to the threads of the knuckle or wrist pin. The wrist pin chuck is arranged for securing the pin against a nut as shown, while the knuckle pin chuck has a key which bears against the end of the pin. These chucks are extremely convenient for this class of work and are very easily and cheaply made.

CAR WHEEL AXLE TRUCK.

Fig. 28 shows a car wheel axle truck, which, with the exception of the wheel, is made entirely of 1½-in. iron pipe



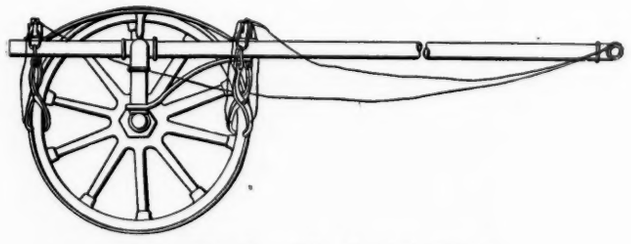


Fig. 28—Car Wheel Axle Truck.

and fittings. By raising the handle and opening the hooks by means of the rawhide cords the axle is gripped by the hooks. The truck is operated by one man and will handle any size of car axle. This truck is easily made at a cost not to exceed $10. The axles are balanced so that the weight comes entirely upon the truck axle.

VALVE SETTING MACHINE.

In Fig. 29 is shown an arrangement for rotating driving wheels for locomotives while setting the valves. An air motor drives a set of gears which rotate the shaft carrying the rollers. The wheels may be rotated in either direction

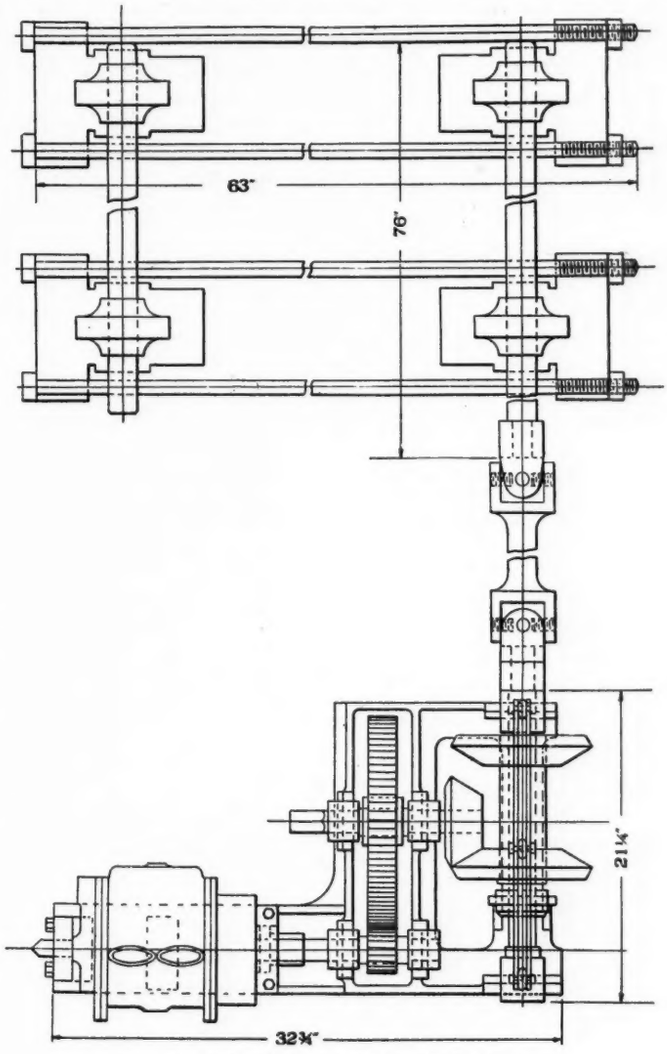


Fig. 29—Valve Setting Machine.

by shifting the gears, provision for which is provided as illustrated. The weight of the engine should be taken off of the main driver by blocking between the saddles and frame in the usual manner.

GREASE FORMING PRESS.

The accompanying illustrations and details, Fig. 30, show a press for forming grease for the Alvin driving box grease cellars or sticks for use in side or main rod cups.

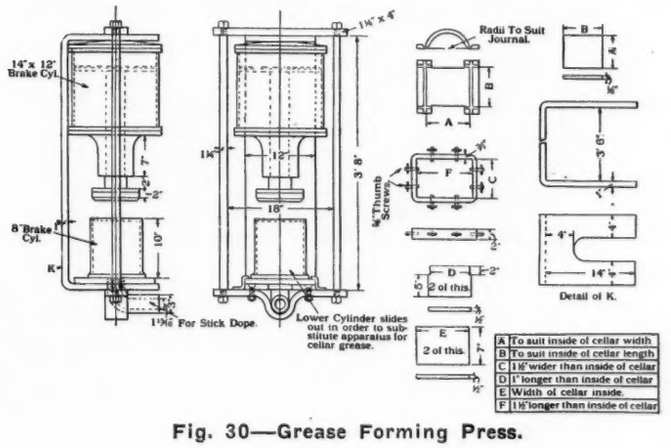


Fig. 30—Grease Forming Press.

A 12-in. x 14-in. brake cylinder is mounted on a frame in a vertical position, as indicated. Adjustable forms are made to suit the various sizes and designs of journals and driving box cellars. The illustration shows the machine arranged with forms for making dope sticks for rod cups. This press is usually located in the oil houses at large division points.

PORTABLE OIL RIVET FORGE.

The illustration, Fig. 31, shows an efficient design of portable oil rivet forge. The frame work is made of sheet steel and angle irons and is mounted on three wheels, the leading one of which carries a tongue for hauling the forge about the shop. A tank, 16½ in. in diameter and 33 in. high, is mounted at the rear for storing the crude oil. The oil is

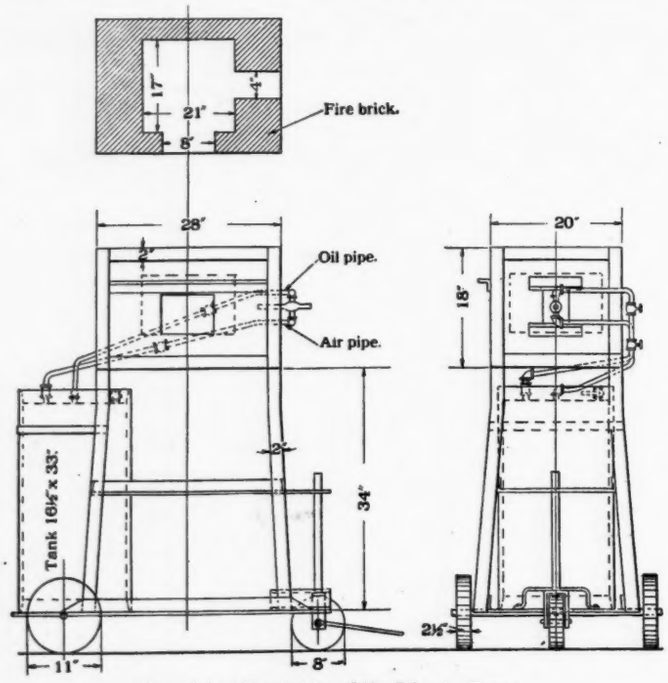


Fig. 31—Portable Oil Rivet Forge.

forced to the burner by air pressure, and the oil and air are mixed at the burner in proper proportions for complete combustion. The interior of the furnace is 17 in. wide by 21 in. long and has an 8-in. opening. The interior of the furnace is lined with fire brick. A very intense heat can be obtained in a short time, and provision is made for close regulation. This forge will heat rivets for several gangs at the same time.

TRIPLE VALVE PACKING RING GRINDER.

Fig. 32 shows a triple valve packing ring grinder designed for operating on four valves at the same time. These valves are placed over the vertical bolts and held in position by keys. The valves are revolved in a horizontal direction, and the cam shaft seen at the bottom of the illustration gives a

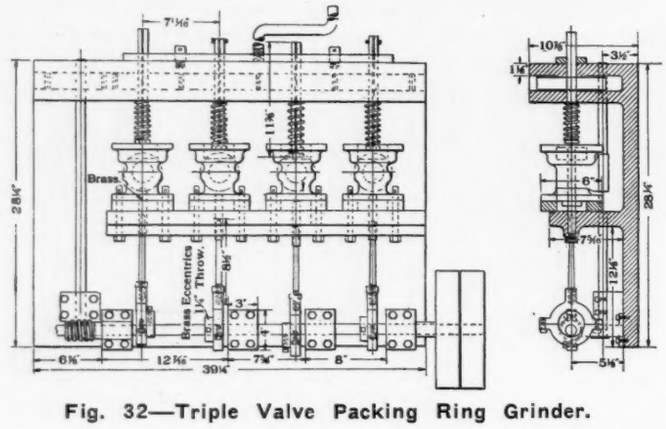


Fig. 32—Triple Valve Packing Ring Grinder.

vertical reciprocating motion to the piston, which combination of motions grinds the packing rings in a very satisfactory manner. This machine has a capacity for 50 triple valves per hour.

CART FOR BOILER WASHERS.

The plan and elevation drawings, Fig. 33, show a cart to be used by boiler washers in the roundhouse. It is made of steel and arranged to hold all the necessary tools and equipment for boiler washing. The hose is carried on the rear, and

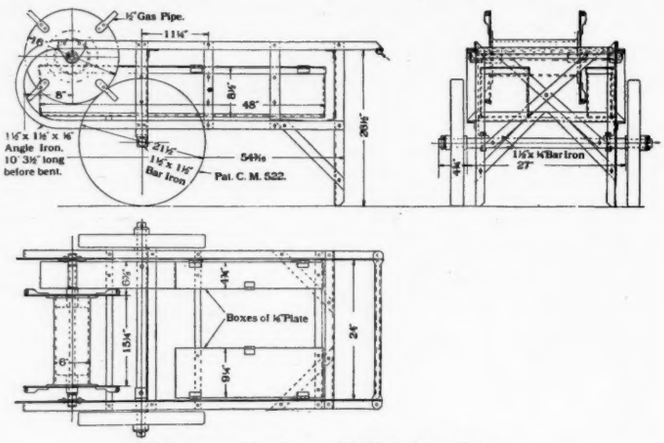


Fig. 33—Cart for Boiler Washers.

the boxes, arranged along the inner side of the cart, carry the various wrenches, nozzles, etc. Locks are provided for the boxes so that the equipment is kept in the cart rather than in various cupboards.

WRENCH PUNCHING AND FORMING DIES.

Fig. 34 illustrates a set of dies and holders for punching and forming flat wrenches in a bulldozer. The first operation in making these wrenches is to cut the blank, and the dies for this operation are shown at the left of the drawing.

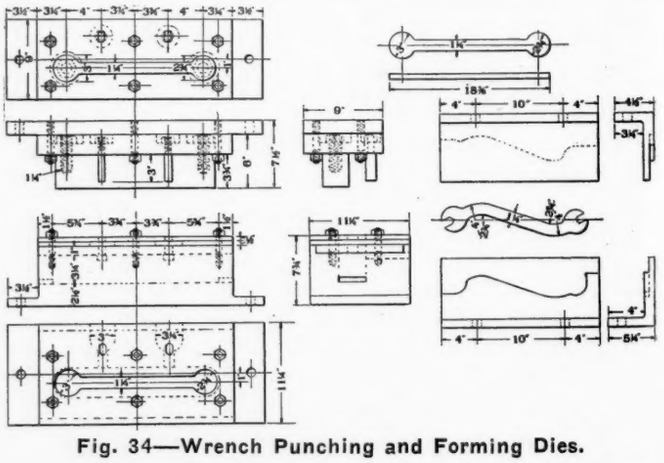


Fig. 34—Wrench Punching and Forming Dies.

The second operation is the bending of the blank to the desired shape, and the forming dies for this process are shown on the right of the sketch. The third and final operation is the cutting out of the opening for the jaws. All three operations are done with one heating. This device will make wrenches for ⅜-in. to 1-in. nuts at a rate of 250 an hour with two men.

TWENTY-FOURTH COLLECTION.

BY C. J. DRUBY,
General Roundhouse Foreman, A., T. & S. F., Albuquerque, N. Mex.

DEVICE FOR LOADING CAR WHEELS.

In the accompanying illustration, Fig. 35, is shown a very efficient device for loading car wheels. As the hoist raises a

pair of wheels, the skids move up also, and when sufficiently high the wheels roll out of the head and into the car without

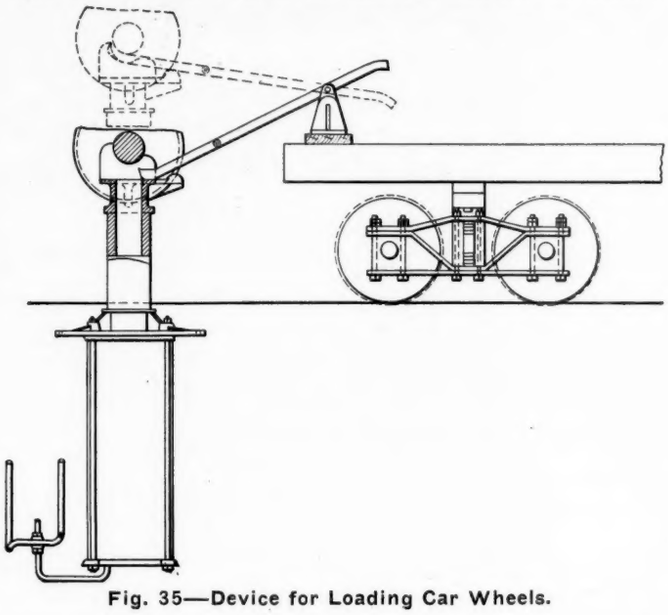


Fig. 35—Device for Loading Car Wheels.

any handling. By this method it is only necessary to roll the wheels in position over the hoist and apply the air.

DEVICE FOR REMOVING TANK BRASSES.

In removing tank brasses two hydraulic jacks are generally used. By this method the wheel is often raised, preventing the brass from being removed. In this case it is necessary to use a pry on top of the wheel, which requires extra help to remove a defective brass. By the device here shown, Fig. 36, one man can readily remove a brass in four or five min-

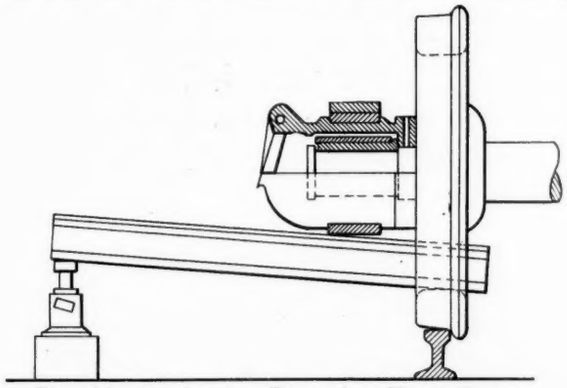


Fig. 36—Device for Removing Tank Brasses.

utes. A small screw or hydraulic jack is placed about 4 ft. from the wheel and a piece of rail used as a lever.

STEAM SAND DRYER.

In the accompanying line cut, Fig. 37, is shown a steam sand dryer, which is very simple and does the work of two

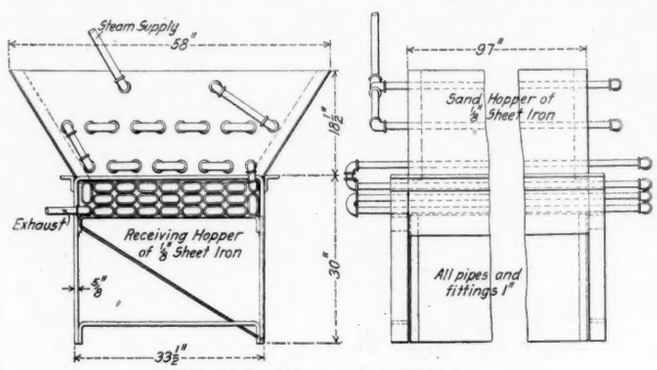


Fig. 37—Steam Sand Dryer.

stoves. The hopper is about 4 ft. x 8 ft. and has a bed of pipes in the bottom. These pipes are placed close together and will not allow the sand to pass through while wet or damp, but when dry, it falls through readily without any shaking or sifting. All of the joints of the piping are made outside, and, in case of a leak, the sand in the hopper is not moistened.

TWENTY-FIFTH COLLECTION.

BY D. P. KELLOGG,
Master Mechanic, Southern Pacific, Los Angeles, Cal.
Collection Signed also by W. F. Merry and G. H. Goodwin, General Foreman and General Gang Foreman.

STEEL FRAME REPAIR TABLE.

The line drawings, Figs. 38 and 40, and in the half-tone, Fig. 39, show a table designed for repairing all classes of steel frames. This work is coming to require more and more attention, as the number of steel cars in use is rapidly increasing.

The table is substantially built of concrete, reinforced with rails held in place by a number of anchor bolts. The top

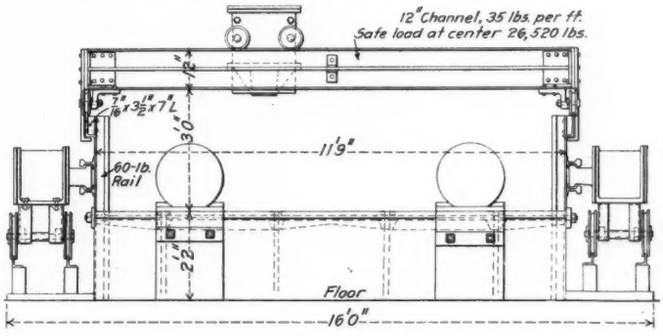


Fig. 38—Elevation of Steel Frame Repair Table.

surface is composed of sectional plates, which form a face plate. A number of T-slots for holding down the work are provided. There are two movable cylinders on each side of the table, which may be placed in any position to exert side pressure. The end cylinders are stationary for exerting pressure on the opposite corners in case of the frame being out of

Fig. 39—Steel Frame Repair Table.

square. These cylinders are held in place by lugs bolted to the upper rails. An 18-in. cylinder, having a capacity of 19,000 lbs. downward pressure, can be moved in any position, its carriage traveling lengthwise of the table, while the cylinder itself travels across the carriage. With this cylinder ordinary

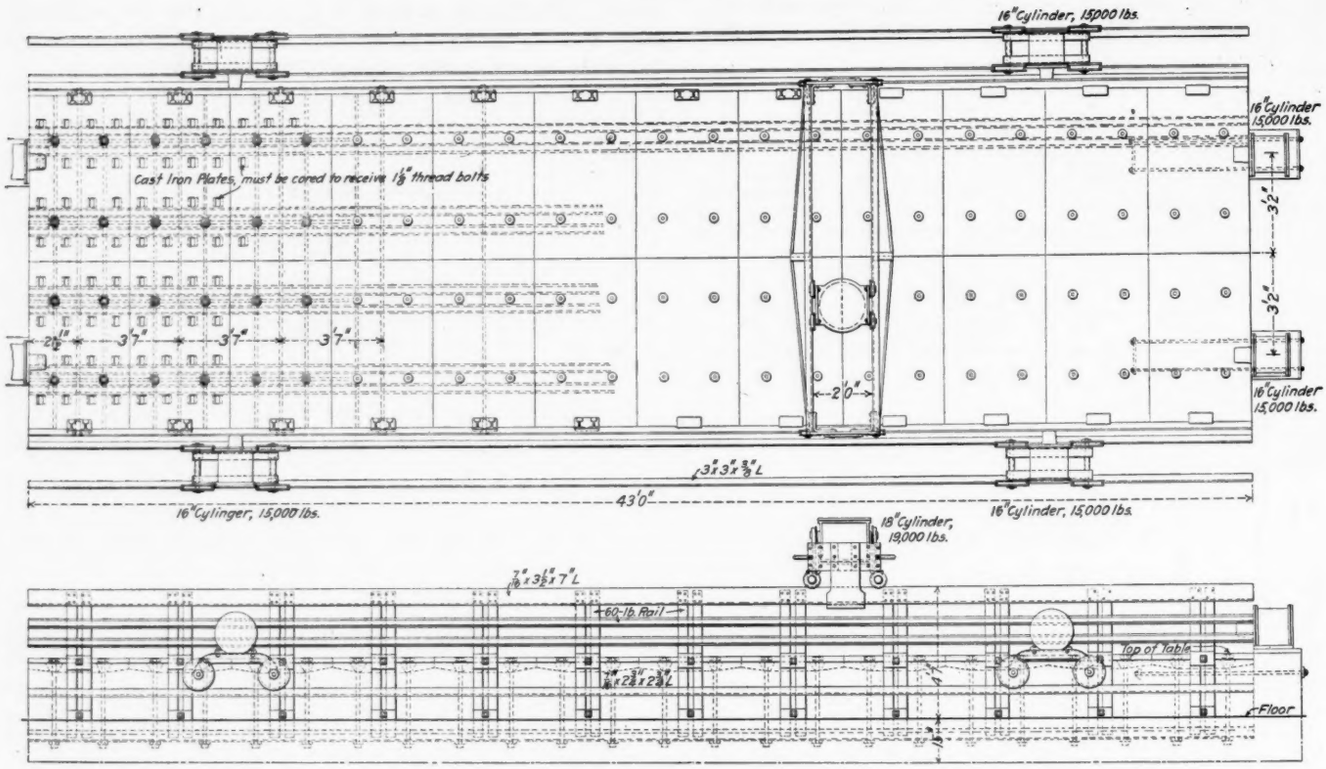


Fig. 40—Plan of Steel Frame Repair Table.

bends may be straightened cold. In case of sharp kinks in the frame it is heated before applying the pressure.

This table is a new departure in these shops and is found to be very valuable in taking care of steel car work.

ECCENTRIC BLADE BENDER.

In Fig. 41 is shown a very light and effective eccentric blade bender. It is capable of bending a plate 1¼ in. thick and 4 in. wide. It is easily adjusted for bending in either direction, it being only necessary to reverse the block. It will also be noticed that the key is detachable. A particular point of merit in this kink is in the fact that it may be used without disconnecting the eccentric blade, and in case of emergency, it can be used as a blade twister by placing a chisel of piece of iron under one edge of the block.

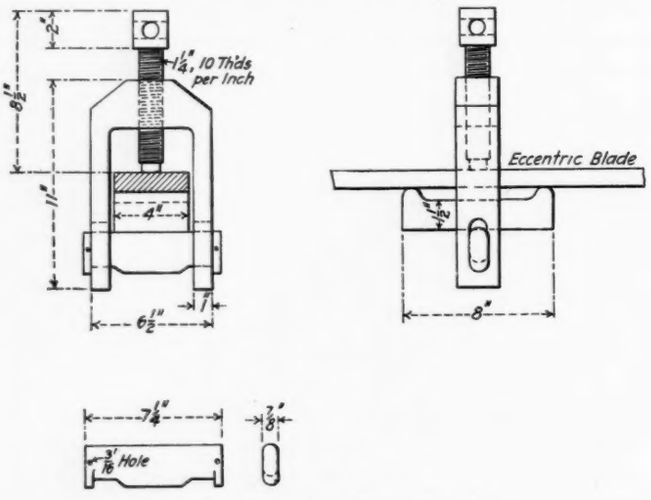


Fig. 41—Eccentric Blade Bender.

TOOL FOR DRILLING SQUARE HOLES.

Fig. 42 illustrates a combination for drilling square holes on a drill press. There has been several articles printed on this subject, but the device shown is one which was made and is used in the Southern Pacific shops at Los Angeles, Cal., for drilling square holes in crank pin collars. The collar is placed on two parallel strips and the soft steel cap is then adjusted and clamped in position. This cap centers the work, being bored out to fit over the collar. Inserted in the cap is a hardened steel guide, secured by four pins. This guide has a square of the same size as the intended square hole. The drill is made of a long piece of steel, as shown, which allows it to give the necessary spring when in operation. The cutting end of the drill is triangular in shape, with a cutting edge on

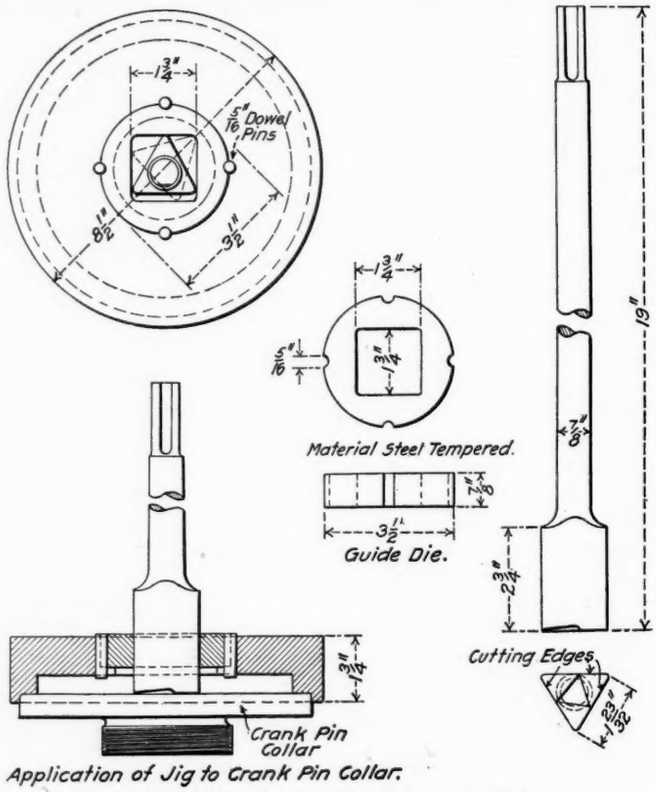


Fig. 42—Tool for Drilling Square Holes.

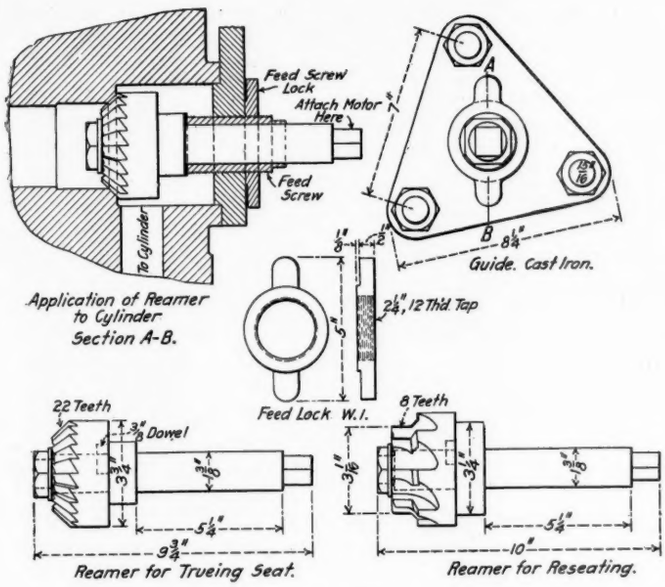


Fig. 43—Circulating Valve Reamers.

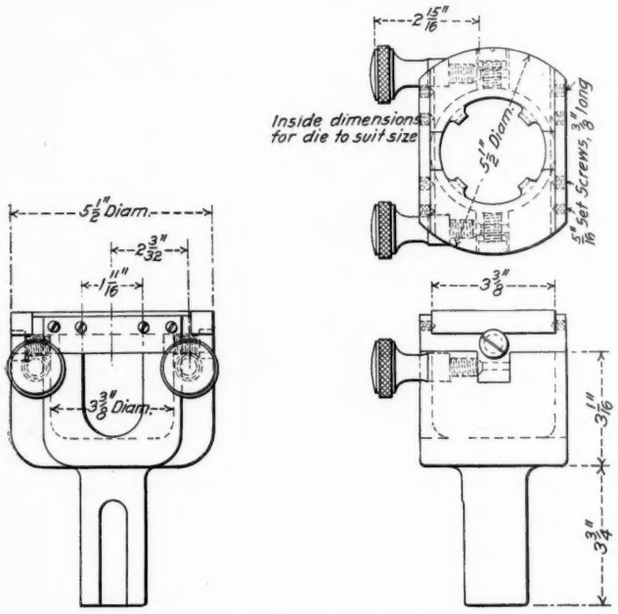


Fig. 44—Combination Die Holder.

each corner, and is fitted to the guide block so that it will turn free at the four corners. The drawing shows this combination designed for drilling 1¾-in. holes ⅞ in. deep.

CIRCULATING VALVE REAMERS.

The illustration, Fig. 43, shows two styles of reamers and their application in reaming circulating valve seats. To do this satisfactorily two reamers are required, one of which is called the reseating reamer, which provides the correct width and the other reamer is a finishing tool. Care should be taken that the width of the seat in the casting is smaller than that of the valve. A slow running motor may be applied for power, but a good ratchet is satisfactory, especially when a workman has but one engine on which to do this work.

COMBINATION DIE HOLDER.

In Fig. 44 is shown a combination die holder, used principally on the turret lathes for brass work. This style of die holder has given perfect satisfaction, and as it is adjustable, the dies can be reground without changing the size of the holder. The die is removed from the cage by loosening the knurled screws. A large number of dies can be used with the one holder. The size shown is for use on standard hose nipples, water car nipples or any work between 2 and 3 in.

TAPER ATTACHMENT.

Fig. 45 shows detail views and Fig. 46 the position on a machine of an attachment applied to an Acme staybolt cutter

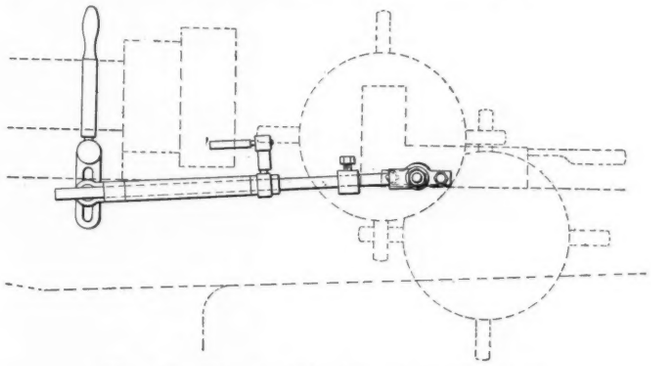


Fig. 46—Taper Attachment in Position.

for cutting taper threads on crown or radial staybolts. This was designed as a shop kink, but it proved so valuable, especially where there was a large number of taper bolts to be cut, that it was patented by H. Neville, tool room foreman of the Southern Pacific at Los Angeles, Cal., and is now being handled by the Acme Machinery Co., Cleveland, Ohio. The device confines the bolts to one machine, where they are finished with both straight and taper threads. Previous to having this

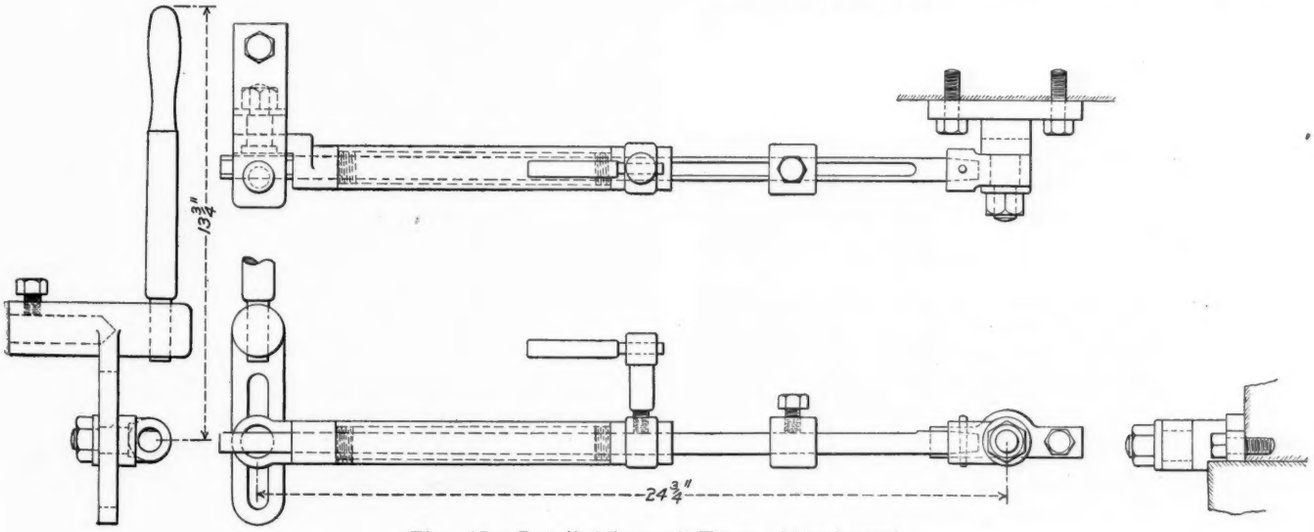


Fig. 45—Detail View of Taper Attachment.

attachment, two machines were used for this work. By the use of this attachment the cost of cutting threads on stay-bolts has been reduced 60 per cent. A novel feature of this attachment is that it can be adjusted to cut any taper from ½-in. to 2-in. in 12-in. It can be operated automatically and may be adapted to other arrangements in cutting both brass and iron.

TOOL FOR CUTTING FLUE SHEET HOLES.

In Fig. 47 is shown a tool for cutting holes in flue sheets. The particular feature of this holder is the small amount of high speed steel required, being only two pieces ⅜-in. x ¾-in. x 2⅛-in. The cutters are sawed to their proper length and then placed in a special jig in the lathe, four at a time, turned to the proper diameter with clearance, and bored with clearance on the inside. Another special feature is the provision

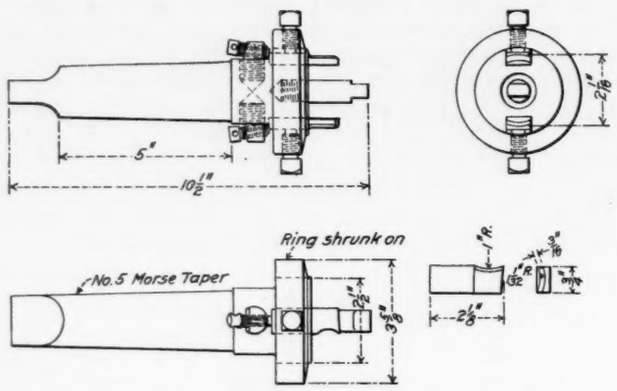


Fig. 47—Tool for Cutting Flue Sheet Holes.

for breaking the sharp corners on the flue hole. This is done by leaving a fillet in the cutter. The steel cutters are held rigid in the holder, which is provided with thrust screws, by which accurate adjustment of the cutters can be obtained.

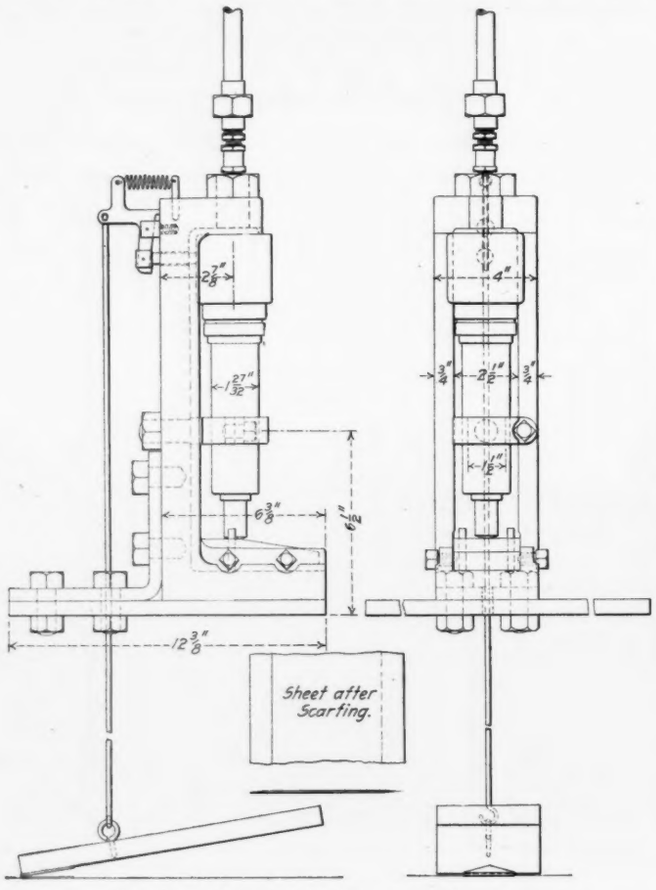


Fig. 48—Pneumatic Scarfing Hammer.

With this tool the flue holes are cut out in the corners chamfered in one operation at the rate of 60 holes per hour.

PNEUMATIC SCARFING HAMMER.

Fig. 48 shows a pneumatic scarfing hammer for making flue ferrules. Previous to having this machine this work was done by the use of a hammer, anvil and stool. Strips of galvanized iron were cut of a width equal to the circumference of the flue hole and about 24 in. long, and the edges were then hammered down by hand, after which the strips were cut into widths to suit the flue sheet. With the pneumatic hammer, however, which is bolted to a substantial bench, the strips are cut as mentioned above, but are fed through the hammer at a very rapid rate. The air is controlled by a pedal.

CHECK LIFTER.

Fig. 49 shows a very handy check lifter. The drawing shows the lifter as used on a consolidation engine check with flat seat. It very often occurs after the engine is steamed up

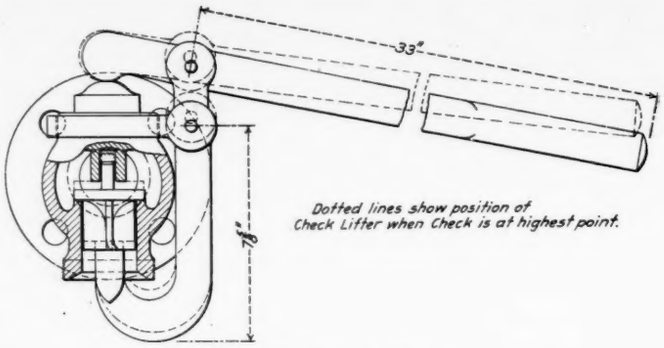


Fig. 49—Check Lifter.

that a chip or piece of scale lodges under the valve and prevents its closing. In this instance the check lifted is used and is applied by merely disconnecting the flange pipe. With this lifter it is possible to open a check against 200 lbs. boiler pressure.

ROLLS FOR JACKET IRON.

Fig. 50 shows a set of rolls used to form the round part of jackets for boiler heads. All of the Southern Pacific locomotives have their boiler heads covered with lagging jackets. Ordinarily planished iron is used, and forming the round part

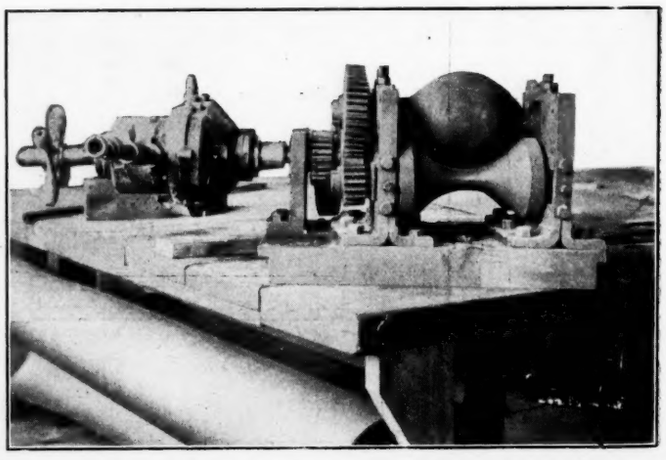


Fig. 50—Rolls for Jacket Iron.

by hand was a considerable job. The rolls are operated by an air motor, and a variety of radii may be obtained by adjusting the rolls. It will be noticed that heavy gears are required.

SHOP LOCOMOTIVE.

Fig. 51 shows a small locomotive that was originally used on one of the suburban runs. The cab was removed and a

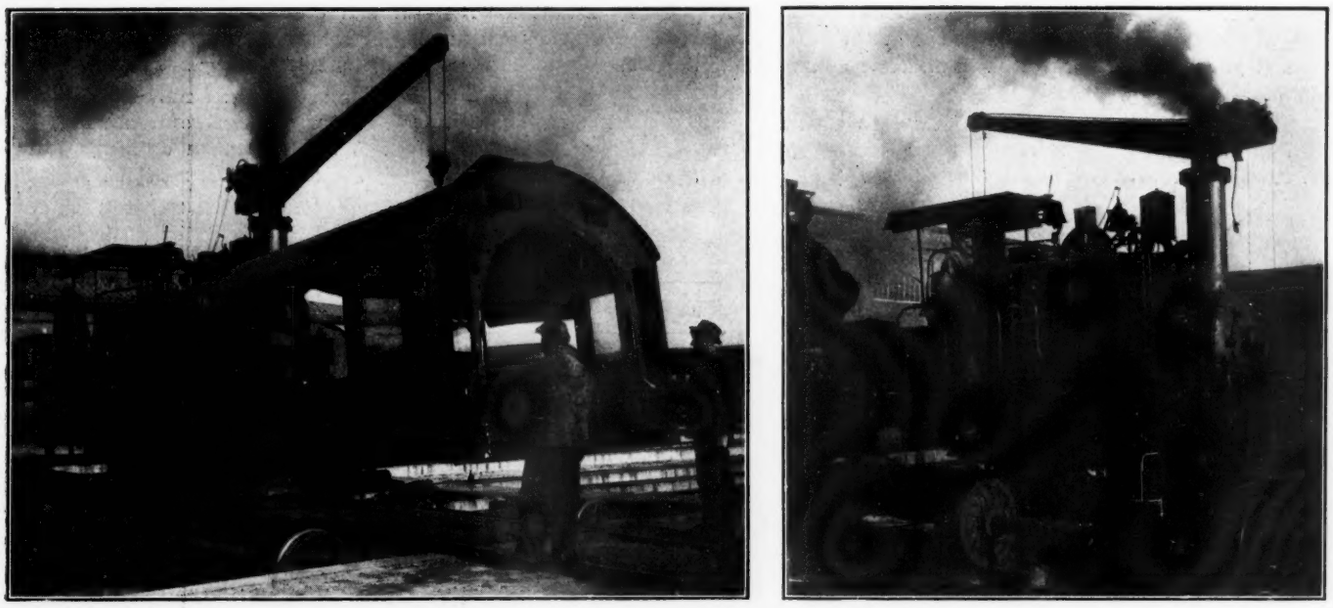


Fig. 51—Shop Locomotive.

large saddle tank applied to give additional weight on the drivers. The stack is used as a mast for the 2½-ton crane, and suitable roller bearings are bolted on the inside of the stack to facilitate swinging the crane when carrying a load. An 8-in. air pump furnishes power to run the 2½-ton motor, which is bolted to the lower end of the boom. A ½-in. cable runs through the pipe over the sheave at the outer end of the boom. The turn-table at Los Angeles accommodates this engine and one of the larger ones at the same time, and it is used for transferring locomotives from one pit to another in the roundhouse. The crane is sufficiently strong to lift a pair of steel tired tender wheels, and sufficiently high to lift a pressed steel boiler front into place or handling cabs. It is also extensively used for loading and unloading material.

DRAWBAR AIR LIFT.

In Fig. 52 is shown a handy air lift, mounted on a low wagon and used to remove defective drawheads and replace new ones on tenders, cars, etc. The wagon is rolled under the tender or car and the pistons run up against the drawhead and yoke. The nuts are then easily removed and the drawhead lowered. The phantom illustration shows both the high and low positions of a drawhead on this lift.

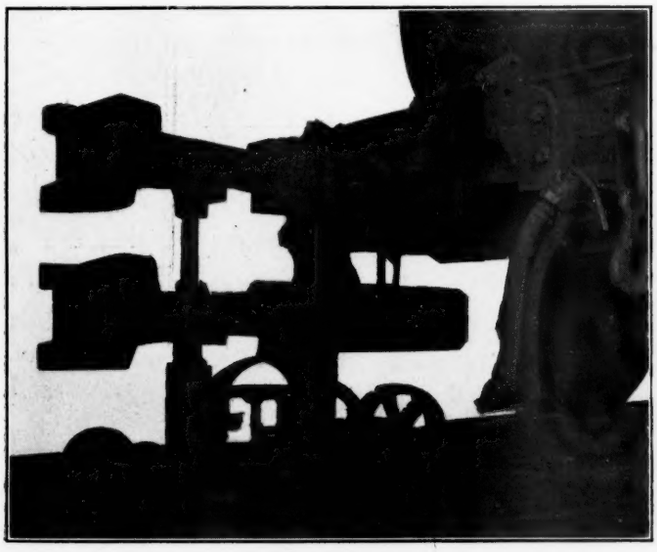


Fig. 52—Drawbar Air Lift.

DEVICE FOR PLACING WHEELS IN A LATHE.

Fig. 53 shows an air lift attachment to a coach wheel lathe for placing and removing wheels. The half tone shows two

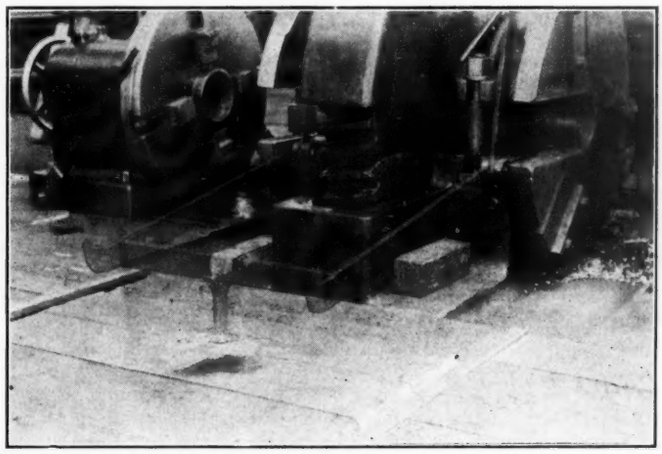


Fig. 53—Device for Placing Wheels in Lathe.

positions of the lift. The lower provides for running the wheels on to the lift, after which air is applied, causing the wheels to roll along the lift into position in the lathe.

AIR LIFT FOR TURNING WHEELS.

In Fig. 54 is shown an air lift set on the floor to turn

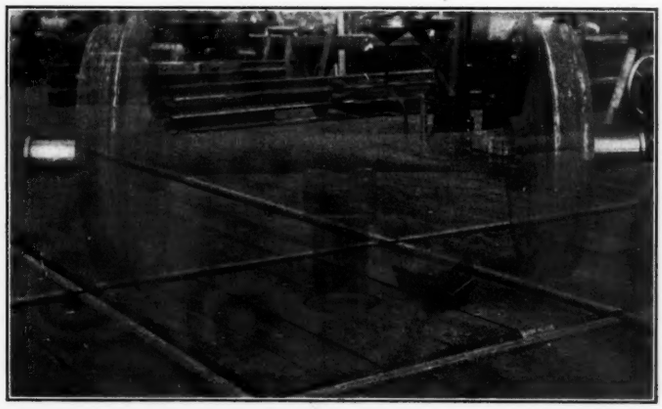


Fig. 54—Air Lift for Turning Wheels.

wheels from a pit track to the track along the center isle of the shop. One of these lifts is placed at the rear of each of the 24 pits. The sills are 18 in. in diameter and will take the heaviest driving wheels.

PNEUMATIC PRESS FOR FORMING GREASE CAKES.

Fig. 55 shows a pneumatic press for forming grease cakes. A feature of this device is the convenient way of refilling the cylinders after the grease has been pressed out. The cylinder is hinged, to be dropped down by removing a pin, after which the grease is easily removed. Three grease cakes for a 10-in. x 12-in. driving box journal can be made with one filling of the cylinder. The cake, 36 in. long, is pressed out at one end of the cylinder through a forming nozzle on to a table, where it is cut into suitable lengths with a knife attached, on a sliding hinge, to the back side of the table. The different sizes of nozzles are quickly placed, no screws being used to fasten them. The grease cylinder is made of 10-in. pipe, 17 in. long, and an ordinary 12-in. x 12-in. air cylinder.

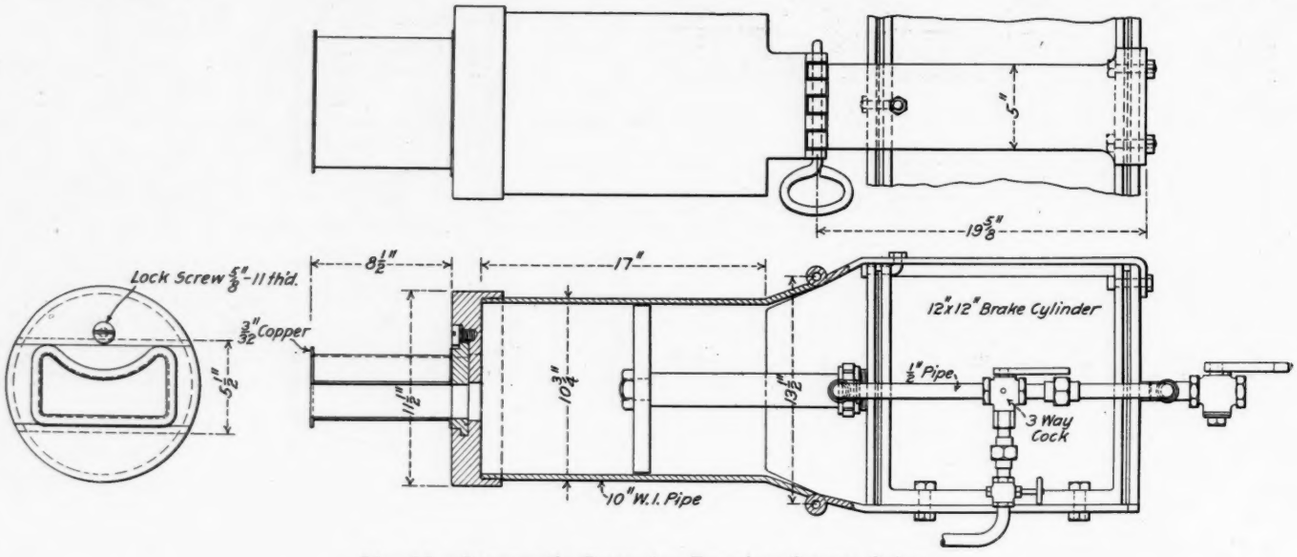


Fig. 55—Pneumatic Press for Forming Grease Cakes.

TWENTY-SIXTH COLLECTION.

BY L. M. GRANGER,
Asst. Gen'l Foreman, Erie Railroad, Galion, Ohio.
Collection Signed also by John Todd, Machine Foreman.

ECCENTRIC BLOCK JIG.

This chuck, Fig. 56, consists of a flat plate held in place on the boring mill by lugs which fit into the slots of the table. A boss is turned on the fact to enable finishing the eccentric at one chucking. The mandrel is securely held in position by a bolt inserted through the center of this boss, and is prevented from turning by a key. The eccentric block is then slipped on to the mandrel and is held by set screws.

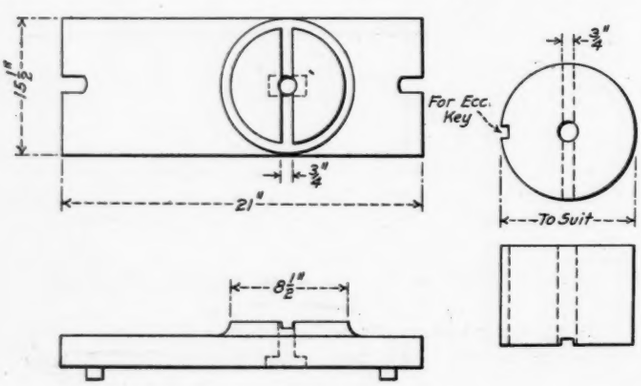


Fig. 56—Eccentric Block Jig.

CHUCK AND GAGE FOR CROWN BEARINGS.

Fig. 57 shows a V-block for setting crown bearings on a planer bed. This block is made from an ordinary pedestal casting, and is held in place on the planer by the lug which is cast on the bottom and machined to fit the slot in the platen. The brass, which has been previously machined on the lathe or on a vertical mill, is placed on the V-block, as indicated, and held in position by a long clamp and bolts, which latter also hold the V-block to the planer. The tool for obtaining the size of the brass from the box is also shown. It is adjusted to the box size by the thumb screws, and the end lugs are adjusted to the proper angle of the retaining shoulder. After the tool is adjusted to size it is placed against the end of the brass and the size transferred.

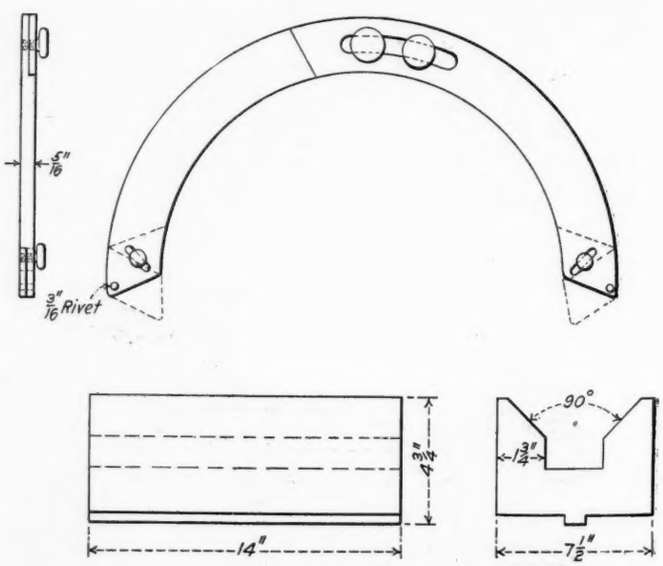


Fig. 57—Chuck and Gage for Crown Bearings.

SHOE AND WEDGE CHUCK.

This chuck, Fig. 58, is made of a forging. Lugs on the bottom fit into the grooves of the platen, and the clamps are inserted through the openings shown. The two sizes of chucks of this design are sufficient to accommodate all of the shoe and wedge sizes used in the Erie shops at Galion, Ohio.

The shoe or wedge is adjusted to position by four set screws, making it unnecessary to use shims. The construction of the chuck is such that these set screws are easily accessible. The

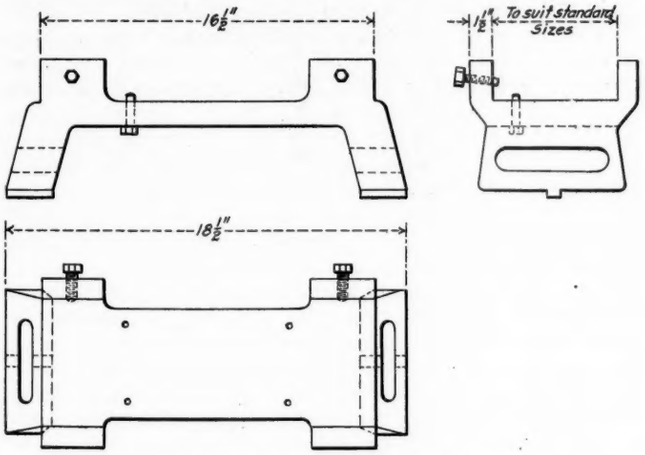


Fig. 58—Shoe and Wedge Chuck.

castings are held by the set screws, which engage it at an angle as shown.

TIRE WEAR GAGE.

The tire wear gage, shown in Fig. 59, is a very simple and

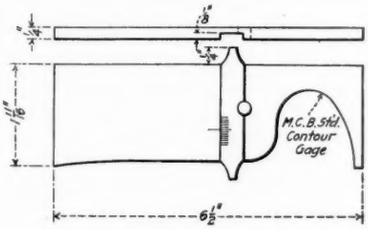


Fig. 59—Tire Wear Gage.

effective tool. The sliding blade, which is adjusted by means of a lock and nut bolt, is located one inch from the throat of the flange. The gage is placed in position over the flange, and the sliding blade pressed down to contact with the tire, the wear being indicated on the graduations. The straight side of the gage is used for measuring the wear of plain tires in a similar manner.

HORIZONTAL MILL GAGE.

This gage, Fig. 60, consists of a V-shaped block similar to the base of an ordinary surface gage. A needle or pointer is secured to the base and adjusted by the thumb screw and

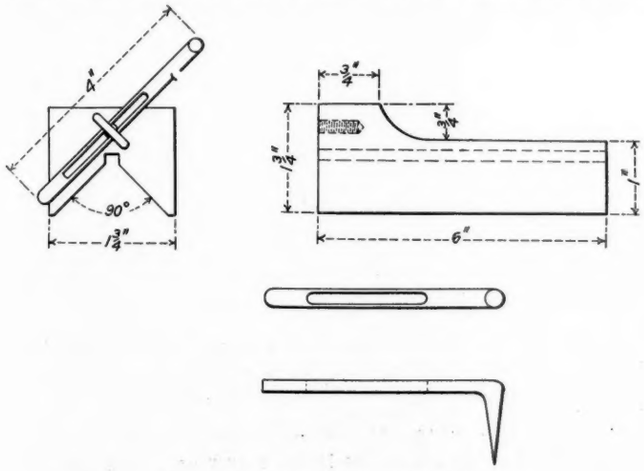


Fig. 60—Horizontal Mill Gage.

slot as shown. This tool is used for truing work similar to a surface gage.

MISCELLANEOUS KINKS.

BY JAMES STEVENSON,
Foreman, Pennsylvania Railroad, Olean, N. Y.

TEMPORARY RECEPTICLE FOR SAND.

The arrangement here shown, Fig. 61, is for use when repairing locomotive sand boxes. Two holes are drilled through the top of the barrel and an iron rod is run through it. Another hole is bored in the bottom, as shown, and a sheet iron valve is arranged for closing. When it is necessary to draw the sand from the box it is run into the barrel and repairs are completed, the barrel is lifted up over the sand box and the sand allowed to run into the box by opening the small valve shown.

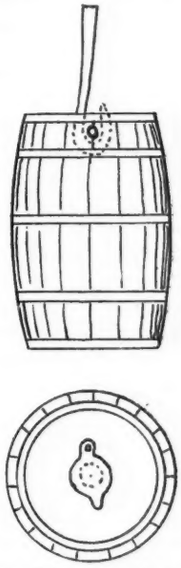


Fig. 61—Temporary Receptacle for Sand.

BY C. V. FRISK, CHICAGO.

METHOD OF DETERMINING RADII.

It is frequently necessary to obtain the radii of irregular parts of machinery, piping or patterns, and a templet of wood or cardboard is often used for this purpose. An easier and more rapid method is to use a piece of soft solder or wire, especially when the work is small. Before using, the wire should be straightened and freed of kinks. A stick, shaped on the end, as shown, is then used to form the wire to the desired shape. The portion of the circle may then be laid off on any flat surface and the radius easily determined.

The illustration, Fig. 62, shows wire used in this manner for obtaining the large radius of a steam pipe, and also for obtaining the small radius of the cross section.

Another method of obtaining the large radius of a steam pipe is also shown in the illustration. By this method it is possible to make a working sketch of such a pipe without re-

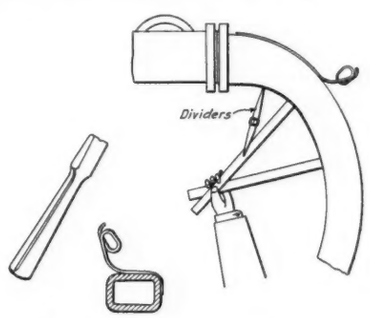


Fig. 62—Method of Determining Radii.

moving it from the engine. Two pieces of wood are held, as shown, to form a steady support, which is easily obtainable by placing the points of contact at some distance from each other. A pair of dividers is then adjusted, supporting one leg on one of the sticks as indicated. By marking the points of contact at several different points along the pipe the required center may be obtained.

NOTES FROM THE COLLINWOOD SHOPS OF THE LAKE SHORE.

The locomotive shop of the Lake Shore & Michigan Southern at Collinwood, Ohio, has 18 live pits for engine repairs, and its capacity has been gradually increased so that the output in general repairs is 50 engines per month or nearly

three engines per pit. It was not so long since one engine per pit was regarded as a high development of shop operation, but it was soon found possible to double this output, and under the high pressure of modern methods, three engines per pit is made possible. The shop capacity is no longer measured by pits but by machines, men and methods behind the pits and the degree to which they are forced to maximum capacity.

The locomotive builder and the manufacturer of railway supplies when required to increase capacity do not immediately build on an addition to the shop, but after it is keyed up to maximum output for the day, it is put on overtime, or a night shift is organized. This plan has been followed at Collinwood, and the large output has been made possible by a balancing of the different departments so that no one is waiting for the other, and material is always at hand ready for all who require it. When all such methods are applied, and some one or two departments are still behind the others, they are made to balance up by working increased hours and a night shift is put on.

The Lake Shore is one of the few railways which has nearly all its locomotives, including switch engines, fitted with the brick arch, and its success is largely due to the use of bricks in small units supported on arch tubes. These small units are easily handled; they are not liable to break, and can be readily removed and replaced for staybolt or tube repairs. The advantage of the brick arch as a smoke preventer is generally recognized, and when this can be obtained with a saving in fuel, an improvement in the water circulation and a large reduction in tube failures, it becomes a very important factor in locomotive practice. The experience of the Lake Shore with the Security brick arch for nearly three years has demonstrated these advantages beyond all doubt. It is estimated that the saving in fuel per annum amounts to nearly one-half million dolars, and the saving due to the reduction in tube repairs is also large. The average life of the arch in passenger engines is one month; freight engines, 1½ months, and switch engines, 4 to 5 months. The saving in fuel necessary to defray the expenses of the brick arch is 1.7 per cent. for passenger engines, 1 per cent. for freight engines and 0.5 per cent. for switch engines. The brick arch thus pays for itself in saving of fuel several times over, while the railway secures at the same time the advantages of reducing the smoke nuisance and tube failures. The arch tubes are kept clean by the use of a hydraulic tube cleaner made by the Liberty Manufacturing Co., Pittsburgh, Pa.

Another practice which is used perhaps more largely in the Collinwood shops than in others is the use of bronze bushings for the link motion, both Stephenson and Walschaerts, in place of case hardened bushings. The bronze bearings are not so liable to cut, they are quickly and easily made, and are much cheaper than the hardened bushing. This practice has been carried so far as to make the link block itself of bronze. The use of bronze shells and hub liners for steel driving boxes has already been illustrated in our pages, but a bronze face for the wearing portion next the wedge and shoe we have not before noticed, and it is now the general practice of this railway. These faces are cast on in the brass foundry as a separate operation after the shell and hub liner are cast.

The wooden pilot is being rapidly replaced on this railway by a short, stubby, pressed steel pilot which appears to answer all purposes and costs less to make and maintain. Railway tracks in the East and the Middle West are now so well protected that the long, slanting cow catcher is no longer necessary, and the pilot is growing shorter as this requirement is lessened, and we may before long reach a condition where the pilot will be abandoned and the two horn bars, seen on the side of European front bumpers, will answer our purpose also.

The number of apprentices at Collinwood given special instruction in both the school and the shop is unusually large, as more than 100 of them are here being prepared for the various trades in railway shops.

In each department a shop instructor devotes his entire time to the instruction of the apprentices in the use of tools, and a record is kept of their time on different machines. Each boy is given two hours' instruction two days per week in the drawing room and many of these drawings are for shop use. They are traced and sent to the mechanical engineer's office, where they are properly titled and issued as standard blueprints. It is not unusual for an apprentice to use in the shop a drawing which he made while in the drawing room and this is certainly a good example of the direct application of the school to industrial occupation.

The roundhouse at Colinwood is a busy place, as there are turned here 100 engines per day. The house contains 49 stalls and it is equipped with a modern hot water washing plant. On an average 18 engines are washed per day, or 540 per month, and the time consumed in washing each boiler is two hours. The number of men employed on strictly roundhouse work is 265.

The shop surgeon's office, with a complete hospital operating outfit, is located in the upper story of the shop office and it is found a great benefit to have such facilities conveniently at hand. Accident cases receive immediate attention from the surgeon and chances for infection which often exist in a dirty shop are, in a great measure, obviated. The time ordinarily lost in going to a doctor's office, and the often long wait there, are also avoided. An important part of the shop surgeon's duty is to make such investigation of shop accidents as to make practicable, if proper safeguards are installed, the avoidance of their occurrence. The surgeon makes a study of safety appliance laws and inspects and criticizes the shops with a view of complying with these laws. Sanitary conditions are also kept under constant inspection and intelligent suggestions are made where improvements are thought necessary. The surgeon also formulates laws regulating the workman's presence at the plant if contagious diseases exist at his home and if suspicious cases of tuberculosis are found a proper decision as to its disposal is made.

FOREIGN RAILWAY NOTES.

An 80-year concession for building and operating an electric funicular from Coyre, Switzerland, to Mittenberg, has been granted. The line is to be single track meter gage.

The total number of passengers carried by Argentine railways during 1908 was 47,150,384, and of cargo 32,211,007 tons were transported. During the past ten years merchandise traffic has increased 22 per cent.

The estimates of the Prussian State Railways for the coming year provide for the purchase of 141,000 tons of steel ties and 3,200,000 timber ties, the cost of the steel being about $200,000 less than that of timber ties.

Of 900 locomotives ordered, or to be ordered, for the coming year for the Prussian state railways, 397 are to be equipped with the Schmidt superheaters. Of the engines for passenger service, 270 out of 363 are to be superheaters, of the freight engines, 127 out of 537.

Beech ties, preserved with tar oil, have been coming into use in Germany, where there is a surplus of this timber (which differs from the American beech), largely because it was considered unfit for ties. An advocate of this wood claims that it costs $2,300 less per mile than iron ties and $1,150 less than pine ties, the latter requiring iron tier-plates, while hardwood tie-plates are used with beech. A further advantage is that beech ties can be laid in gravel ballast, while broken-stone ballast of the best kind is required for iron ties.

Supply Trade Section.

The Minnequa plant of the Colorado Fuel & Iron Co. at Pueblo, Colo., was destroyed by fire February 22. The loss is estimated in press reports at $500,000.

Walter H. Cottingham, president of the Sherwin-Williams Co., Cleveland, Ohio, has accepted the position of executive member of the Railway Business Association.

The Northern Engineering Works, Detroit, Mich., has recently delivered three 15-ton and one five-ton Northern cranes to the Globe Arizona plant of the Miami Copper Co., New York.

W. A. Ten Winkle, who for the last five years has been publicity manager of the Electric Controller & Mfg. Co., Cleveland, Ohio, has resigned to become affiliated with the Penton Publishing Co., Cleveland, Ohio, as a special representative.

Harry W. Finnell, for the past four years connected with the Chicago Railway Equipment Co., Chicago, has resigned to accept a position with the Carbon Steel Co., Pittsburgh, Pa., with headquarters at 30 Church street, New York. His resignation is effective March 1.

George P. Heinz & Co., Denver, Colo., have been appointed western selling agents for David Lupton's Sons Co., Philadelphia, Pa. The new agents will handle the territory west of the Missouri river in the sale of Lupton factory specialties, including the steel sash, rolled steel skylight, Pond operating device and Pond continuous sash.

The Isthmian Canal Commission will receive bids, until March 14, for hose, packing, gaskets and rubber belting (Circular No. 563), and until March 21 for a hoisting engine, pumps and motors, spiral riveted pipe and fittings, foot valves, dredging sleeves, push cars, revolving screen sections for rock crusher, steel, iron, switches, track frogs, tie plates, angle bars, track bolts and spikes, wooden tie plugs, piles, etc. (Circular No. 564.)

The McKeen Motor Car Co., Omaha, Neb., advises that its cars are now in operation in 18 states on 28 roads. Sixty cars are now in service, 55 of which are west of the Missouri river. The company makes a practice of delivering the cars on their own wheels and under their own power. One 70-ft. car for the Norfolk & Southern has recently made the trip in this manner from Omaha, Neb., to Norfolk, Va. Two cars for the Oregon Railroad & Navigation Company were sent in the same manner from Omaha to Portland, Ore.

The Oliver Iron Mining Co., Duluth, Minn., users of about 150 steam shovels, has just placed an order for class 80-18-3 Atlantic steam shovel equipment for the coming season with the Atlantic Equipment Co., New York. The conditions under which these steam shovels are operated, in stripping the overburden from the Missabe range ore deposits, are very severe. The material is glacial drift, consisting mainly of stiff, hard clay full of boulders as large as 100 cu. yds. in volume. The shovels are in service summer and winter, and are worked double shift. The temperature is often as low as 50 deg. below zero. This year's order for steam shovels was placed with the Atlantic Equipment Co. after a season's test of one of the new design, class 80-18-3 Atlantic shovels in the Mountain Iron and Burt-Pool mines during 1908-1909.

The railway department of the International Correspondence Schools, Scranton, Pa., has been engaged in revising its railway courses so as to keep them up to date. This year the work was begun earlier than usual, as it was desired to get instructions into the hands of students embodying the latest information on the construction, operation and care of the E. T. locomotive brake equipment, the K and L triple valves, Mallet compounds and other new apparatus, besides giving instruction regarding the locomotive and locomotive running which conforms to present practice. The revision is being made at the school's instruction rooms, 5037 Cottage Grove avenue, Chicago, and will not be finished for some weeks. Representatives have been sent by the railways with which the schools have contracts, so as to make sure that the instruction, when revised, will cover the conditions of service on the different railways, both in this country and in Canada. The representatives sent by the railways include traveling engineers, air-brake superintendents and instructors and engineers. The schools have found from past experience that the best results are obtained when revisions are made by representatives of the railways to whose employees the instruction is to be given. It is expected that the revised instruction will be ready for distribution by about May 1.

C. C. Steinbrenner, the new vice-president of the Galena-Signal Oil Co., New York, was born in Cleveland, Ohio, September 20, 1863, and was educated at the public schools of that city. From 1877 to 1880 he served as printer's apprentice in the German Baptist Publication Society of Cleveland and attended night school at the Spencerian Business College, where he studied bookkeeping and stenography under the founder of that system. In the spring of 1881 he was employed as stenographer and assistant clerk in the office of motive power department, C. & P. division of the Pennsylvania Railroad. Due to the removal of this office to Wellsville, Ohio, he resigned in the fall of the same year to accept a position as clerk in the office of the county auditor at Cleveland. In the spring of 1882 he returned to the Pennsylvania at Wellsville as assistant shop clerk, which position he resigned in the following September to become assistant clerk in the office of the superintendent of machinery of the Cleveland, Columbus, Cincinnati & Indianapolis at Cleveland. In 1885 he was promoted to be secretary to that officer and stenographer to the general attorney of the same road. In 1890 he was moved to Indianapolis and promoted to be chief clerk in the motive power department of the Cleveland, Cincinnati, Chicago & St. Louis. He resigned that position in May, 1893, and moved to Chicago to become chief clerk in the motive power department of the Illinois Central, which position he resigned in the following December to accept the position of auditor of the railway department of the Galena-Signal Oil Co., which he held until his election to the vice-presidency on February 10. General Charles Miller, president; Samuel A. Megeath, first vice-president and general manager, and L. J. Drake, vice-president, were re-elected on the same date.

C. C. Steinbrenner.

Truck Bolster Patent Decision.

The Simplex Railway Appliance Co., Chicago, has been confirmed in its ownership of an important detail, in truck bolsters, by a recent decision of Judge Hazel, of the United States District Court. The Kelley & Bauer patent, owned by the Simplex Company, was for an improvement on the Waldo H. Marshall car truck bolster, consisting of an upper compression member, an under tension member and a king post. The Marshall patent was defective in being weak at the ends where the compression and tension members were riveted together. The Kelley & Bauer patented design made these end fastenings strong enough by the simple method of bending the compression member to a line parallel with the approaching tension member, and then bending and overlapping the tension member and using a small strengthening piece. The judge had no difficulty in disposing of the claims of prior invention. He had, however, some apparent difficulty in meeting the contention that the invention was simply an "obvious mechanical expedient." The importance of the result, however, seems to overwhelm this contention. "The invention, concededly, was

not a big discovery, but it is satisfactorily shown that Bauer devised means to relieve the tension member from the stress of severe strain, with the result that the imperfections of the Marshall metallic bolster were obviated. To this extent he advanced the art, and by his adaptation achieved a new result." "Bauer's form of construction, as has already been said, was the first which was capable of obviating the imperfections of the Marshall bolster and in fulfilling the purpose of the invention."

Railway Business Association Represented at Washington.

At the hearing before the Senate Committee on Interstate Commerce, Feb. 18, George A. Post, president of the Railway Business Association, presented the following list of the members of the association:

Acme Machinery Co., Cleveland, Ohio
Adams & Westlake Co., Chicago.
Ajax Force Co., Chicago.
Ajax Mfg. Co., Cleveland, Ohio.
Allis-Chalmers Co., Milwaukee, Wis.
American Bank Note Co., New York.
American Brake Co., St. Louis.
American Brake-Shoe & Foundry Co., New York.
American Hoist & Derrick Co., St. Paul, Minn.
American Locomotive Company, New York.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
American Radiator Co., Chicago.
American Steel Foundries, Chicago.
American Valve & Meter Co., Cincinnati, Ohio.
Anglo-American Varnish Co., Newark, N. J.
Baldwin Locomotive Works, Philadelphia, Pa.
Barney & Smith Car Co., Dayton, Ohio.
Barnum, Richardson Co., Lime Rock, Conn.
Bass Foundry & Machine Co., Fort Wayne, Ind.
Beaver Dam Malleable Iron Co., Beaver Dam, Wis.
Bettendorf Axle Co., Davenport, Iowa.
Block-Pollak Iron Co., Chicago.
Blue Island Car & Equipment Co., Chicago.
Bordo, L. J., Co., Philadelphia, Pa.
Bosley, D. W., Co., Chicago.
Boston Belting Co., Boston, Mass.
Bourne-Fuller Co., Cleveland, Ohio.
Bowser, S. F., & Co., Inc., Fort Wayne, Ind.
Bradley, Osgood & Sons, Worcester, Mass.
Bridgeport Malleable Iron Co., Bridgeport, Conn.
Brill, J. G., Co., Philadelphia, Pa.
Brooker, Chas. F., Ansonia, Conn.
Brown Car Wheel Works, Buffalo, N. Y.
Buckeye Steel Castings Co., Columbus, Ohio.
Bucyrus Co., South Milwaukee, Wis.
Buda Co., Chicago.
Buffalo Brake-Beam Co., New York.
Buffalo Car Wheel Foundry Co., Buffalo.
Camel Co., Chicago.
Central Coal & Coke Co., Kansas City, Mo.
Champion Rivet Co., Cleveland, Ohio.
Chase, L. C., & Co., Boston, Mass.
Chicago Bridge & Iron Works, Chicago.
Chicago Car Heating Co., Chicago.
Chicago Pneumatic Tool Co., Chicago.
Chicago Railway Equipment Co., Chicago
Chicago Varnish Co., Chicago.
Cleveland Copper Ferrule Co., Cleveland, Ohio.
Cleveland Frog & Crossing Co., Cleveland, Ohio.
Cleveland Twist Drill Co., Cleveland, Ohio.
Clow, James B., & Sons, Chicago.
Columbia Nut & Bolt Co., Inc., Bridgeport, Conn.
Commonwealth Steel Co., St. Louis, Mo.
Consolidated Car Heating Co., Albany, N. Y.
Crerar, Adams & Co., Chicago.
Curtain Supply Co., Chicago.
Cyclops Steel Works, Titusville, Pa.
Dayton Malleable Iron Co., Dayton, Ohio.
Dayton Manufacturing Co., Dayton, Ohio.
Dearborn Drug & Chemical Works, Chicago.
Decatur Car Wheel Co., Atlanta, Ga.
Devoe, F. W., & Raynolds, C. T., Co., New York.
Dickson Car Wheel Co., Houston, Tex.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Dressel Railway Lamp Works, New York.
Dudgeon, Richard, New York.
Eccles & Smith Co., San Francisco, Cal.
Edwards, O. M., Co., Syracuse, N. Y.
Ehret Maguesin Mfg. Co., Philadelphia, Pa.
Electric Railway Journal, New York.
Elliot Frog & Switch Co., East St. Louis.
Faessler, J. W., Mfg. Co., Moberly, Mo.
Fairbanks, Morse & Co., Chicago.
Featherstone Foundry & Machine Co., Chicago.
Flannery Bolt Co., Pittsburgh, Pa.
Flood & Conklin Co., Newark, N. J.
Forsyth Brothers Co., Chicago.
Franklin Mfg. Co., Franklin, Pa.
Franklin Railway Supply Co., Franklin, Pa.
Galena-Signal Oil Co., Franklin, Pa.
General Electric Co., New York.
General Railway Supply Co., Chicago.
Gifford-Wood Co., Hudson, N. Y., and Chicago.
Gray, Peter, & Sons, East Cambridge, Mass.
Gold Car Heating & Lighting Co., New York.
Gould Coupler Company, New York
Griffin Wheel Co., Chicago.
Hale & Kilburn Mfg. Co., Philadelphia, Pa.
Hall Signal Co., New York.
Hammett, H. G., Troy, N. Y
Hart Steel Co., Elyria, Ohio.
Hartshorn, Stewart, Co., East Newark, N. J
Haskell & Barker Car Co., Michigan City, Ind.
Heath & Milligan Mfg. Co., Chicago.
Hewitt Mfg. Co., Chicago.
Hibbard, Spencer, Bartlett & Co., Chicago.
Hickman, Williams & Co., Chicago.
Hines, Edward, Lumber Co., Chicago
Hunt, Robert W., & Co., Chicago.
Hunt-Spiller Mfg. Corporation, Boston, Mass.
Hutchins Car Roofing Co., Detroit, Mich.
Independent Pneumatic Tool Co., Chicago.
Inland Steel Co., Chicago.
International Steam Pump Co., New York.
Interstate Iron & Steel Co., Chicago.
Iroquois Iron Co., Chicago.
Jenkins Brothers, New York.
Johns-Manville, H. W., Co., New York.
Joseph, Isaac, Iron Co., Cincinnati, Ohio.
Joyce, Cridland Co., Dayton, Ohio.
Joyce-Watkins Co., Chicago.
Kay & Ess, Dayton, Ohio.
Keasbey & Mattison Co., Ambler, Pa.
Keith Car & Mfg. Co., Sagamore, Mass.
Kerite Insulated Wire & Cable Co., New York.
Kirby Equipment Co., Chicago.
Laconia Car Company, Boston, Mass.
Lake Erie Iron Co., Cleveland, Ohio.
Lidgerwood Mfg. Co., New York.
Lobdell Car Wheel Co., Wilmington, Del.
Locomotive Finished Material Co., Atchison, Kan.
Long, Chas. R., Jr., Co., Louisville, Ky.
Lowe Bros. Co., Dayton, Ohio.
Lufkin Rule Co., Saginaw, Mich.
Magnus Metal Co., New York.
Manning, Maxwell & Moore, Inc., New York.
Marshall Car Wheel Foundry Co., Marshall, Tex.
Marshall-Wells Hardware Co., Duluth, Minn.
Marvin Manufacturing Co., Ltd., Franklin, Pa.
Maryland Car Wheel Works, Baltimore, Md.
McConway & Torley Co., Pittsburgh, Pa.
McCord & Company, Chicago.
McQuesten, Geo., Co., Boston, Mass.
Metal Plated Car & Lumber Co., New York.
Midland Steel Company, Philadelphia, Pa.
Milwaukee Coke & Gas Co., Milwaukee, Wis.
Miner, W. H., Co., Chicago.
Missouri Malleable Iron Co., East St. Louis, Ill.
Morden Frog & Crossing Works, Chicago.
More-Jones Brass & Metal Co., St. Louis, Mo.
Mott, J. L., Iron Works, New York.
Mound City Paint & Color Co., St. Louis, Mo.
Mt. Vernon Car Mfg. Co., Mount Vernon, Ill.
Murphy Varnish Company, Newark, N. J.
Nathan Manufacturing Co., New York.
National Machinery Co., Tiffin, Ohio.
National Malleable Castings Co., Cleveland, Ohio.
National Lock Washer Co., Newark, N. J.
New York Air Brake Co., New York.
New York Belting & Packing Co., Ltd., New York.
New York Car Wheel Co., Buffalo, N. Y.
Niles-Bement-Pond Co., New York.
Northwestern Fuel Co., St. Paul, Minn.
Pantasote Co., New York.
Parkesburg Iron Co., Parkesburg, Pa.
Patterson-Sargent, Co., Cleveland, Ohio.
Peerless Rubber Mfg. Co., New York
Pettibone, Mulliken & Co., Chicago.
Pickands, Brown & Co., Chicago.
Pittsburgh Forge & Iron Co., Pittsburgh, Pa.
Pittsburgh Spring & Steel Co., Pittsburgh, Pa.
Pneumatic Gate Co., Chicago.
Poole Bros., Chicago.
Portland Iron & Steel Co., Boston, Mass.
Pratt & Lambert, Inc., Buffalo, N. Y.
Pratt & Letchworth Co., Buffalo, N. Y.
Pyle-National Electric Headlight Co., Chicago.
Quaker City Rubber Co., Philadelphia, Pa.
Railway Age Gazette, New York.
Railroad Supply Co., Chicago.
Railway Steel Spring Co., New York.
Ramapo Foundry & Wheel Works, Ramapo, N. Y.
Ramapo Iron Works, Hillburn, N. Y.
Rand, McNally & Co., Chicago.
Rank & Goodell, St. Paul, Minn.
Republic Iron & Steel Co., Pittsburgh, Pa.
Robinson, Cary & Sands Co., St. Paul, Minn
Rodger Ballast Car Co., Chicago.
Rogers, Brown Co., Chicago.
Ryerson, Jos. T., & Son, Chicago.
Safety Car Heating & Lighting Co., New York.
Schieren Company, Charles A., New York.
Scully Steel & Iron Co., Chicago.
Seattle Car Mfg. Co., Seattle, Wash.
Sellers, William, & Co., Inc., Philadelphia, Pa.
Sherburne & Co., Boston, Mass.
Sherwin-Williams Co., Cleveland, Ohio.
Simmons Hardware Co., St. Louis, Mo
Sipe, James B., & Co., Pittsburgh, Pa.
Soper Lumber Co., Chicago.
Spring Lake Iron Co., Fruitport, Mich.
Standard Car Truck Co., Chicago.
Standard Car Whheel Co., Cleveland, Ohio.
Standard Coupler Co., New York.
Standard Forgings Co., Chicago.
Standard Paint Co., New York.
Standard Railway Equipment Co., Pittsburgh, Pa.
Standard Steel Car Co., New York.
Standard Steel Works Company, Philadelphia, Pa.
Storrs Mica Co., Owego, N. Y.
Symington, T. H., Co., Baltimore, Md.
Taylor, W. P., Co., Buffalo, N. Y.
Titan Steel Casting Company, Newark, N. J.
Treat, C. A., Mfg., Co., Hannibal, Mo.
Tyler Tube & Pipe Co., Washington, Pa.
Tyler, W. S., Co., Cleveland, Ohio.
Union Draft Gear Co., Chicago.
Union Steel Casting Co., Pittsburgh, Pa.
Union Switch & Signal Co., Swissvale, Pa.

United Supply & Mfg. Co., Chicago.
U. S. Metal & Mfg. Co., New York.
U. S. Metallic Packing Co., Philadelphia, Pa.
Upham & Agler, Chicago.
Walsh, P. T., Davenport, Iowa.
Walworth Manufacturing Co., Boston, Mass.
Ward Equipment Co., New York.
Warner & Swasey Co., Cleveland, Ohio.
Waterous Engine Works, Co., St. Paul, Minn.
Western Electric Co., New York.
Western Railway Equipment Co., St. Louis, Mo.
Westinghouse Air Brake Co., Pittsburgh, Pa.
Westinghouse, Church, Kerr & Co., New York.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Westmoreland Coal Company, Pittsburgh, Pa.
White Enamel Refrigerator Co., St. Paul, Minn.
Whiting Foundry Equipment Co., Harvey, Ill.
Willard Sons & Bell Co., Chicago.
Wood, Guilford S., Chicago.
Worth Brothers Co., Coatesville, Pa.
Wyckoff Pipe & Creosoting Co., New York.

Mr. Post called the attention of the committee to the fact that the association represents an investment of capital of over $800,000,000. He pointed out that the supply manufacturers were the ultimate consumers of the discipline which Congress is imposing on the railways; they employed about 1,500,000 workmen, supporting families aggregating five or six million individuals, and all these people were affected when investors became convinced that railway regulation was proceeding too fast, and hesitated to lend their money.

Mr. Post further said: We earnestly urge that you, acting as trustees for us and those dependent upon us, may scrutinize each of these proposed provisions with the same anxious care as you would if it were your own business which was to be regulated. Commerce at best is beset with uncertainties. We who gain our livelihood by purveying to public utility enterprises have the greatly exaggerated uncertainty of never knowing very long in advance under what statutes we may be obliged to operate. If you should demonstrate, by your moderation in the present congress, that you sympathize with our difficulties and necessities and hold a purpose to proceed gradually rather than abruptly, you would give courage and confidence to those whose courage and confidence mean everything to us.

May we not respectfully suggest for your consideration this test to be applied to each legislative proposal: Is it absolutely necessary in the public interest, at this time, when business conditions are not yet fully restored to normal, to enact this provision?

M. M. and M. C. B. Conventions.

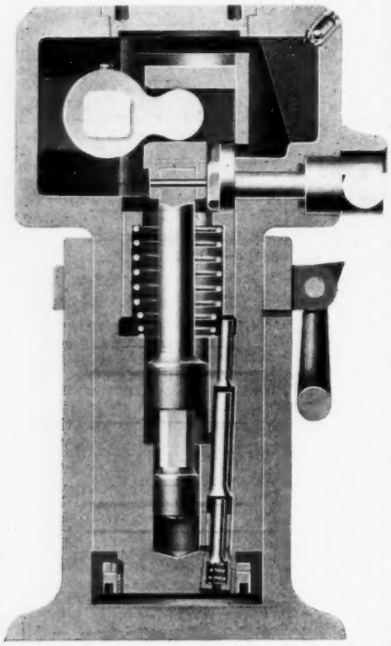
Last week we noted the drawing for exhibit space in connection with the June conventions of the American Railway Master Mechanics' and Master Car Builders' Associations, at which 95 per cent. of space available on the Million Dollar Pier at Atlantic City had been allotted. Following is a list of those to whom definite locations were assigned:

Acme White Lead & Color Works, Detroit, Mich.
Adams & Westlake Co., Chicago.
American Balance Valve Co., Jersey Shore, Pa.
American Brake-Shoe & Foundry Co., New York.
American Car & Foundry Co., New York.
American Engineer and Railroad Journal, New York.
American Joxyl Co., New York.
American Mason Safety Tread Co., Boston, Mass.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
American Radiator Co., Chicago.
American Steel Foundries, Chicago.
Armstrong-Blum Mfg. Co., Chicago.
Armstrong Bros. Tool Co., Chicago.
Barney & Smith Car Co., Dayton, Ohio.
Besly & Co., Chas. H., Chicago.
Bettendorf Axle Co., Davenport, Ia.
Bird & Co., J. A. & W., Boston, Mass.
Bowser & Co., S. F., Fort Wayne, Ind.
Boyle & Co., Inc., John, New York.
Buckeye Steel Castings Co., Columbus, Ohio.
Buffalo Brake Beam Co., New York.
Burroughs Adding & Listing Machine Co., Detroit, Mich.
Butler Drawbar Attachment Co., Cleveland, Ohio.
Carborundum Co., Niagara Falls, N. Y.
Carnegie Steel Co., Pittsburgh, Pa.
Chase & Co., L. C., Boston, Mass.
Chicago Car Heating Co., Chicago.
Chicago Railway Equipment Co., Chicago.
Chicago Steel Car Co., Chicago.
Chicago Varnish Co., Chicago.
Chisholm & Moore Mfg. Co., Cleveland, Ohio.
Cleveland Car Specialty Co., Cleveland, Ohio.
Clew & Sons, Jas. B., Chicago.
Commercial Acetylene Co., New York.
Commonwealth Steel Co., St. Louis, Mo.
Consolidated Car Heating Co., New York.
Consolidated Railway Electric Lighting & Equipment Co., New York.
Continental Railway Equipment Co., Chicago.
Crane Company, Chicago.
Crosby Steam Gage & Valve Co., Boston, Mass.
Curtain Supply Co., Chicago.
Damascus Brake Beam Co., Cleveland, Ohio.
Davis Solid Truss Brake Beam Co., Wilmington, Del.
Dearborn Drug & Chemical Works, Chicago.
Detroit Hoist & Machine Co., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Dickinson, Inc., Paul, Chicago.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Dressel Railway Lamp Works, New York.
Duff Mfg. Co., Pittsburgh, Pa.
Durbin Auto. Safety Car Coupler Co., Fort Scott, Kan.
Edwards Co., O. M., Syracuse, N. Y.
Electric Hose & Rubber Co., Wilmington, Del.
Electric Railway Journal, New York.
Electric Storage Battery Co., Philadelphia, Pa.
Faessler Mfg. Co., J., Moberly, Mo.
Fairbanks, Morse & Co., Chicago.
Flannery Bolt Co., Pittsburgh, Pa.
Flower Waste & Packing Co., New York.
Forsyth Bros. & Co., Chicago.
Ford & Johnson Co., Michigan City, Ind.
Foster Co., Walter H., New York.
Franklin Mfg. Co., Franklin, Pa.
Franklin Railway Supply Co., New York.
Frost Railway Supply Co., Detroit, Mich.
Galena-Signal Oil Co., Franklin, Pa.
Garlock Packing Co., Palmyra, N. Y.
General Electric Co., Schenectady, N. Y.
General Railway Supply Co., Chicago.
Gold Car Heating & Lighting Co., New York.
Goldschmit Thermit Co., New York.
Gould Coupler Co., New York.
Gray & Sons, Inc., Peter, Boston, Mass.
Greene Tweed & Co., New York.
Grip Nut Co., Chicago.
Hale & Kilburn Mfg. Co., Philadelphia, Pa.
Hammett, H. G., Troy, N. Y.
Harrington, Son & Co., Inc., Edwin, Philadelphia, Pa.
Heywood Bros. & Wakefield Co., Wakefield, Mass.
Hobart-Allfree Co., Chicago.
Home Rubber Co., Trenton, N. J.
Hunt-Spiller Mfg. Corporation, Boston, Mass.
Hutchins Car Roofing Co., Detroit, Mich.
Illinois Malleable Iron Co., Chicago.
Independent Pneumatic Tool Co., Chicago.
Jenkins Bros., New York.
Johns-Manville Co., H. W., New York.
Joliet Railway Supply Co., Joliet, Ill.
Joyce-Cridland Co., Dayton, Ohio.
Kerite Insulated Wire & Cable Co., New York.
Keystone Drop Forge Works, Chester, Pa.
Keystone Lantern Co., Philadelphia, Pa.
King Automatic Car Platform Co., Washington, D. C.
Landis Machine Co., Waynesboro, Pa.
Landis Tool Co., Waynesboro, Pa.
Linde Air Products Co., Buffalo, N. Y.
Lupton's Sons Co., David, Philadelphia, Pa.
Macleod & Co., Walter, Cincinnati, Ohio.
Manning, Maxwell & Moore, Inc., New York.
Mason Regulator Co., Boston, Mass.
Massachusetts Mohair Plush Co., Boston, Mass.
McConway & Torley Co., Pittsburgh, Pa.
McCord & Co., Chicago.
Midvale Steel Co., Philadelphia, Pa.
Modoc Soap Co., Philadelphia, Pa.
Molleson Co., Geo. E., New York.
Nathan Manufacturing Co., New York.
National-Acme Mfg. Co., Cleveland, Ohio.
National Lock Washer Co., Newark, N. J.
National Malleable Castings Co., Cleveland, Ohio.
National Railway Devices Co., Chicago.
Nelson Valve Co., Philadelphia, Pa.
Newhall Engineering Co., Geo. M., Philadelphia, Pa.
Nichols & Bro., Geo. P., Chicago.
Nickelized Castings Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York.
Norton, Inc., A. O., Boston, Mass.
Norton Company, Worcester, Mass.
Pantasote Co., New York.
Parkesburg Iron Co., Parkesburg, Pa.
Pittsburgh Equipment Co., Pittsburgh, Pa.
Pocket List of Railroad Officials, New York.
Pressed Steel Car Co., Pittsburgh, Pa.
Railway Age Gazette, New York.
Railway and Engineering Review, Chicago.
Rapp Co., John W., New York.
Restein Co., Clement, Philadelphia, Pa.
Revolute Machine Co., New York.
Royersford Foundry & Machine Co., Royersford, Pa.
Safety Car Heating & Lighting Co., New York.
Scully Steel & Iron Co., Chicago.
Sellers & Co., Inc., Wm., Philadelphia, Pa.
Spencer Turbine Cleaner Co., Hartford, Conn.
Standard Car Truck Co., Chicago.
Standard Coupler Co., New York.
Standard Steel Car Co., Pittsburgh, Pa.
Standard Steel Works Co., Philadelphia, Pa.
Stoever Foundry & Mfg. Co., New York.
Storrs Mica Co., Owego, N. Y.
Symington Co., T. H., Baltimore, Md.
Taylor Mfg. Co., J. L., Bloomfield, N. J.
Taylor Co., W. P., Buffalo, N. Y.
Templeton, Kenly & Co., Ltd., Chicago.
Titan Steel Casting Co., Newark, N. J.
Toledo Pipe Threading Machine Co., Toledo, Ohio.
Trenton Malleable Iron Co., Trenton, N. J.
Underwood & Co., H. B., Philadelphia, Pa.
Union Draft Gear Co., Chicago.
Union Fibre Co., Winona, Minn.
Union Mfg. Co., New Britain, Conn.
Union Spring & Mfg. Co., Pittsburgh, Pa.
U. S. Metallic Packing Co., Philadelphia, Pa.
U. S. Metal & Mfg. Co., New York.
Vanadium Metals Co., Pittsburgh, Pa.
Vanadium Sales Co. of America, Pittsburgh, Pa.
Ward Equipment Co., New York.
Watson-Stillman Co., New York.
Welsbach Company, Philadelphia, Pa.

West Disinfecting Co., New York.
Western Railway Equipment Co., St. Louis, Mo.
Westinghouse Air Brake Co., Pittsburgh, Pa.
Wheel Truing Brake Shoe Co., Detroit, Mich.
Whipple Supply Co., New York.
Yale & Towne Mfg. Co., New York.

Car Inspector's Jack.

The Dudgeon universal plain type car inspector's hydraulic jack shown in section is said to be the latest improved type of car inspector's jack made. The advantages of this jack over others used by car inspectors are in its speed, lightness and compactness. By referring to the sectional view it will be seen that the jack has two pumps, so that the ram may be run out to meet a load or can lift a light load with double the speed that would be possible with a single pump jack. When it is desired to throw out the auxiliary pump, the valve handle, shown on the side of the cut, is given a quarter turn. The auxiliary pump is then thrown out and the jack has the action of a single pump jack. It will also be noticed that the pistons are arranged in tandem instead of side by side, as is usual in the case of a double pump jack. It will readily be seen that this gives a direct thrust of the operating lever, doing away with the side strain which exists when two pistons are placed side by side and one only is in use. The valves are also placed in tandem, which has the advantage that either piston or any valve may fail and the jack continue operating to the extent of its capacity. All parts of this jack are interchangeable. The small parts are made by automatic machinery, so that they are easily replaceable.



Car Inspector's Jack.

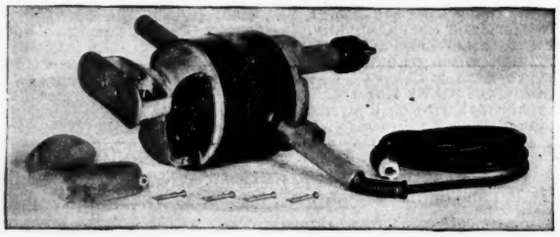
It will be seen that the ram, pump and head containing the reservoir are made in one piece, and that the cylinder and bottom are made in one piece. This greatly reduces the number of parts and consequent joints.

Only two of the three valves are used at a time. If the double pumps are used, the top and the bottom valves are used. If the upper pump is thrown out, the middle and the lower valve only are used. This type of jack contains the universal system of valves and valve control, which has the following distinct advantages: A double pump; a single pressure valve; but three valves in all; one pressure valve, which lowers by means of an independent lowering device; jack lowers by means of both the lever and the valve handle; the position of the valve is indicated by means of the lowering device; the jack can be used horizontally with lever working at an angle; it has superimposed valves and pistons; is provided with valves and pistons that will perform each other's work in case of necessity; the pump may be used while the valves are open, and access to the valves is obtained by the removal of one bonnet. The ball air valve permits the escape of air, but prevents the loss of fluid with which the jack is charged, regardless of the position in which it may be placed. The jack is the 15-ton size, 11 in. high, lifts 5 in. and weighs 43 lbs. It is made by Richard Dudgeon, New York.

Alternating Current Portable Drill.

The direct-current portable breast drill, designed by the General Electric Co., Schenectady, N. Y., is said to have met with such favor that the company is now manufacturing an alternating-current drill, which possesses all the superior features of the direct-current drill and permits the use of this device where alternating-current only is available.

The ruggedness of the design required to withstand hard usage has been duly considered and the drill's weight has been reduced to 21 lbs., which allows its being handled by one person with great ease and rapidity. Two nurled side handles and a breast plate provide ample means for holding the drill securely in position, and an indicating control switch for starting and stopping the motor is located conveniently near the right handle, so that the drill can be operated without releasing the hold. Hand holes provide easy access to the commutators and brushes for inspection and repairs.

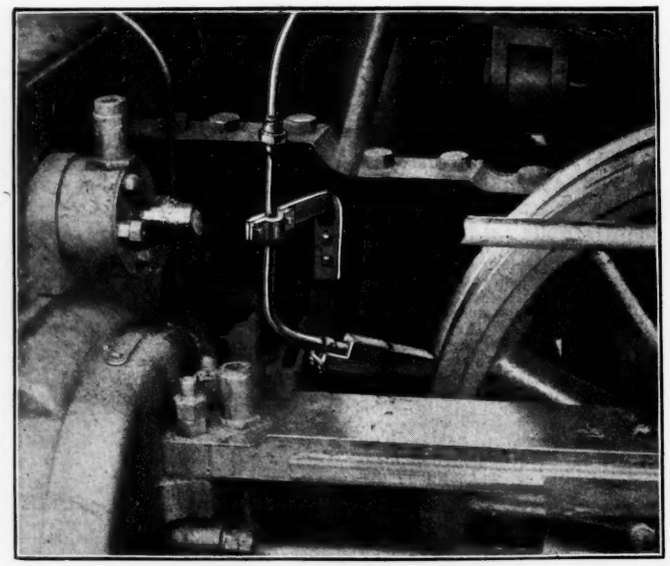


Alternating Current Portable Drill.

The drill is fitted with a Jacobs chuck to take drills up to and including ⅜-in. in diameter. It is said that this machine will drill a ⅜-in. hole, 1 in. deep, in cast iron, in 27 seconds, and the same hole in machine steel in 95 seconds; also, that it will satisfactorily operate a ¾-in. wood bit. It is designed for operation on a 110 or 220-volt, 60-cycle circuit, the connection being made to an ordinary lamp socket plug.

Martin Wheel Flange and Rail Lubricator.

With the increased size and weight of locomotives there has been an increased amount of wear on the flanges and rails, due largely to the rolling motion caused by the height of the locomotive above the rail and to the additional length of rigid wheel base, both of which contribute materially to excessive wear between the fillet of the flange and the inner wearing surface of the rail head. The effect has become particularly noticeable in cost of repairs incidental to changing wheels and tires for turning, and also in rail renewals.



Martin Lubricator in Position.

The Martin wheel flange and rail lubricator shown in the accompanying half-tone has an oil receptacle with gravity sight feed located in the engine cab and connected by suitable piping leading along either side of the boiler to the distributing shoe placed near the flange. This shoe feeds the lubricant at the point of contact with the inner wearing surface of the rail. A bracket, clamped to the piping, holds

the distributing shoe at an angle of about 45 deg. with the center line of the engine. The lower end of the shoe is about 1 in. from the flange and 4 to 6 in. above the horizontal center line of the wheel. In case the wheel flange is worn the insert in the end of the shoe should be shaped to conform.

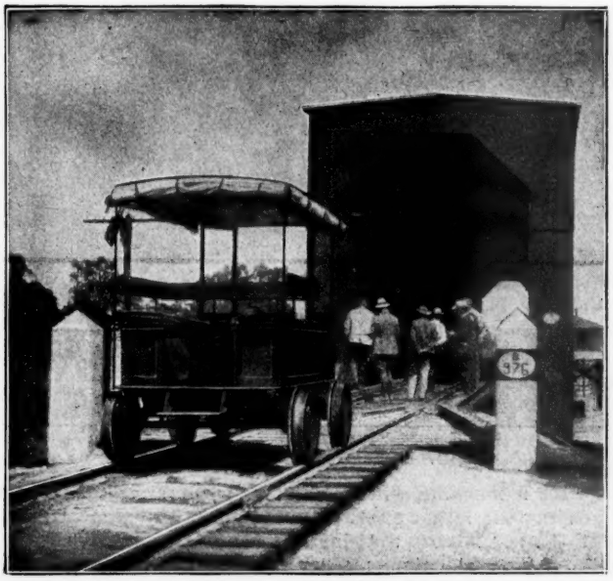
A statement in detail of the results obtained by the application of this device to the forward driving wheels on 69 consolidation engines on the Southern Pacific Railway was published in the *Railway Age Gazette* of January 15, 1909, page 119. From this data it appears that there is a notable saving in tender as well as driving wheel flanges.

This lubricator is patented by J. C. Martin, 210 Balboa building, San Francisco, Cal.

Fairbanks-Morse Inspection Car.

The following record of a run made by a Fairbanks-Morse, Chicago, motor inspection car, illustrated herewith, is an abstract from an article in the Brisbane, South Queensland, *Telegraph*. C. Evans, who is referred to, is an officer of the South Queensland Lines, the company owning the car:

"C. Evans, general traffic manager, started from Brisbane last Monday morning to inspect the line, traveling by the Fairbanks-Morse railway motor inspection car. The car worked splendidly, and without any trouble whatever climbed the main range at a speed of 12 to 15 miles an hour, which rate, Mr. Evans says, could have been greatly increased, if necessary. At various places the road was inspected, stops being made at places where work is in progress. Most of the trip was made in a heavy rain, and as the line is laid on sticky black soil and is unfenced, the traveling was exceedingly difficult, as the car had to plow its way through mud that had been carried onto the rails by teams of bullocks cross-



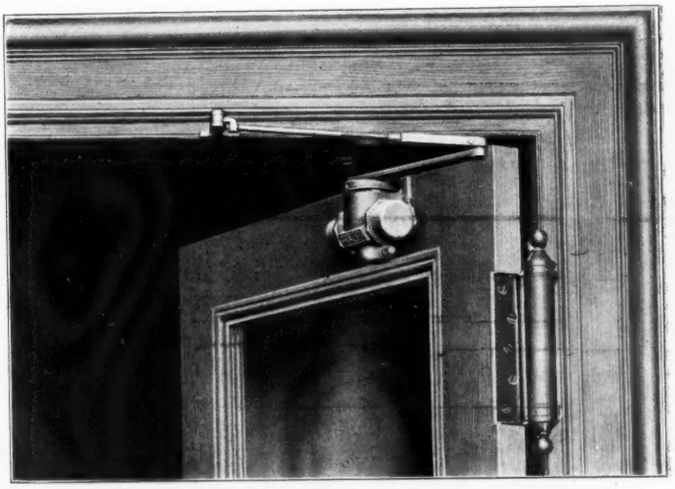
Inspection Car on the South Queensland Lines.

ing and re-crossing the tracks. At Toowoomba the party was advised that the Bell line was blocked by floods, so after consulting with the district engineer Mr. Evans decided to go out on it. They accordingly made the run to Dalby, where they found that the Bell train had not arrived. A gang was sent out on a pump trolley and the inspection car followed. For about the first six miles they ran through three or four inches of water and the traveling was made slower by the sludge on the rails. Mr. Evans and his party found the delayed train at an intermediate point, sent it ahead and proceeded to Bell. Mr. Evans said this morning, when he returned to Brisbane, that the motor car was given a very severe test, covering nearly 600 miles, some of the traveling being exceedingly heavy, and it was generally agreed that it performed excellent service and proved its suitability as an inspection car."

A full description of this car was given in the *Railroad Gazette* of Dec. 6, 1907.

Double-Acting Door Check.

Doors equipped with double-acting spring hinges, permitting them to swing in both directions, oscillate a number of times before coming to rest when they are closed. This action is dangerous to those passing through, is noisy and permits drafts. To overcome this the Yale & Towne Mfg. Company, New York, has designed the Yale double-acting door check, which causes the door, when closing in either direction, to

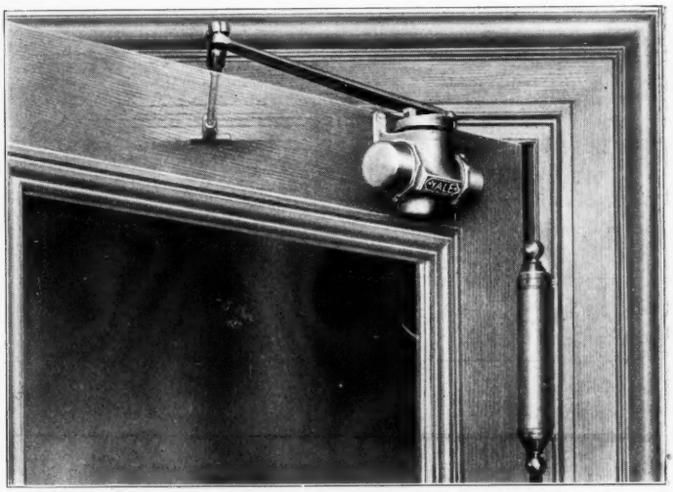


Double-Acting Door Check on Door Opened In.

move quietly, but quickly, to the neutral position, and then to stop. It is constructed on the same principles as the Blount door check for single-acting doors except that it is, of course, a checking device only.

The check consists of a short vertical cylinder, through the top of which projects the spindle, to which is attached the main arm. To the outer end of the latter is attached the adjusting arm, the other end of which is fastened to the door jamb, so that as the door moves the spindle is caused to rotate.

By an ingenious construction of the main arm bracket the door is free to swing in both directions, the arms dropping below the soffit of the door frame when the door swings to



Double-Acting Door Check on Door Opened Out.

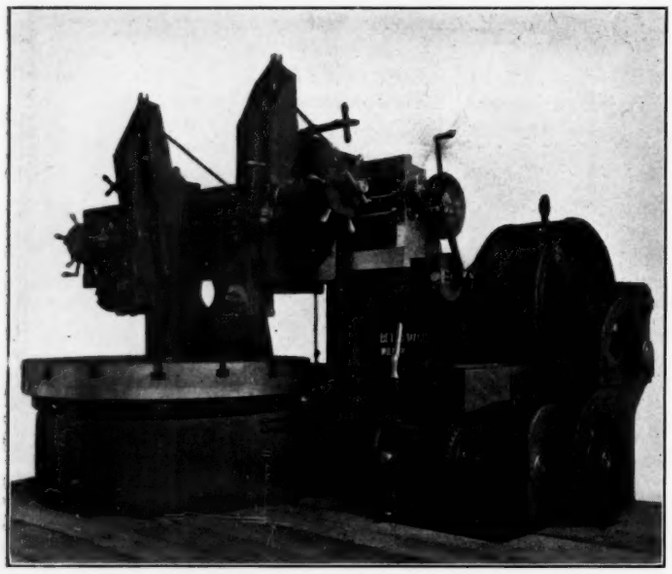
the side opposite to that on which the door check is attached, and passing over the top of the door when the latter is moved in the contrary direction.

The horizontal transverse cylinder at the bottom contains the liquid chamber, the piston, and the regulating valves by which the action of the door may be controlled independently in each direction, according to the varying conditions of wind pressure. The non-freezing liquid is hermetically sealed within the liquid chamber, and a third regulating valve controls the resistance of the door to motion in either direction from its closed position.

Recent Machine Tools.

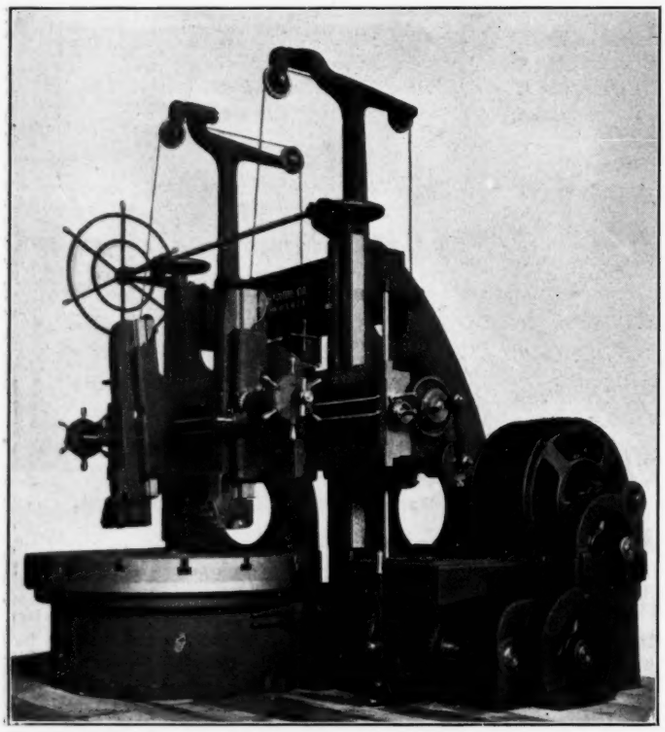
Betts Tire Mills.

The Betts Machine Company, Wilmington, Del., has recently built, from special designs, a number of tire-boring mills for the Inter-Ocean Steel Co., which has just completed its new works at Chicago Heights. The 66-in. tire mill is severely plain and massive in design, and is intended for the heaviest



72-In. Betts Tire Mill with Cross Rail.

work in boring tires and turning wheel centers. The cross rail is fixed and at a sufficient height to clear a variety of locomotive details. The handles for adjustment are all conveniently located, so that all those for one head can be reached from one position. Feeds from $^{1}/_{64}$ in. to $^{3}/_{4}$ in. can be instantly obtained while the machine is in motion. The machine will swing 70 in. in diameter and takes work 18 in. high. A 25-h.p. motor, having speed variation from 325 to



66-In. Betts Tire Mill.

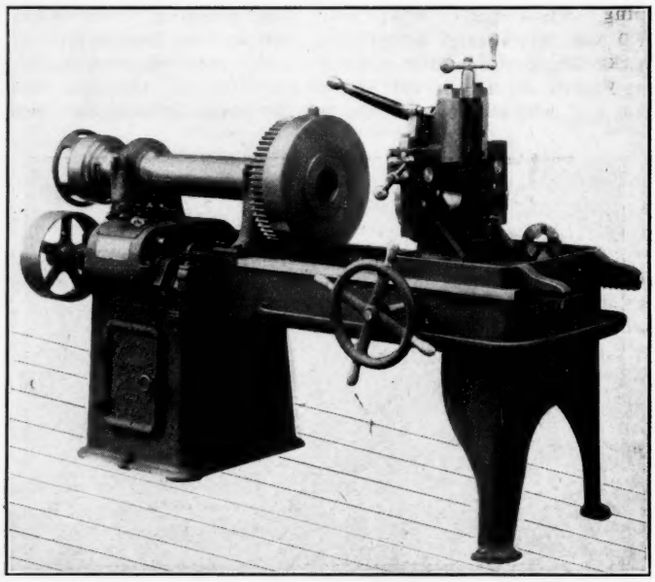
975 revolutions per minute, is used for driving, giving a large power factor for heavy cuts. By means of two sliding gears a cutting speed of 30 ft. per minute is obtained for diameters 6 in. to 66 in. The motor and driving gears are carried on a massive cast plate which is bolted to the upright. All gears are cut from the solid and many of them are steel. The face plate is driven by a steel internal gear bolted to the plate, an arrangement which gives it a stronger and smoother drive and prevents the chip from getting into the gearing. Special care has been taken to protect the operator; all gears are thoroughly guarded and his necessary movements are confined to the front of the machine.

The 72-in. tire mill, which is also illustrated, has a movable cross rail, but it is similar in design in many details to the 66-in. mill above described. It swings 76 in. and takes work 50 in. high under the rail.

A New 3-in. Pipe Machine.

The trend of modern tool design is to eliminate cone pulleys and the use of shifting belts. By using a single driving pulley a constant belt speed is obtained, which is suitable for heavy work. The machine may also be placed parallel to, or at right angles with the counter-shaft. These features have been incorporated in the No. 3 Peerless improved pipe machine, built by the Bignall & Keeler Manufacturing Co., Edwardsville, Ill., an illustration of which is shown herewith.

Threading the smaller sizes of pipe at a uniform speed



No. 3 Peerless Pipe Machine.

requires a machine with a greater speed range than one for threading the larger sizes. For instance, to thread at a speed of 15 ft. per minute a ¼-in. pipe should revolve 106.5 times; a ⅜-in. pipe 84.9 times; a ½-in. pipe 68.2 times, and a 3-in. pipe 16.3 times. In the larger sizes the speeds decrease only in tenths of a revolution. In the machine here shown the speeds are obtained by shifting gears. These gears are made of steel, machine cut, and run in oil. A speed plate is attached to the box for setting the levers by which to obtain the various speeds.

The die head is equipped with the Peerless adjusting mechanism, which is simple, self-locking and reliable. A separate set of dies is furnished for each size of pipe, 10 sets in all. The gripping chuck is of the universal type, and consists of a sliding frame and one upper and two lower jaws and screw, all encased in the chuck shell. The oil pump is direct-connected. The counter-shaft has two loose pulleys for open and cross belts, one rigid and one driving pulley of a 3½-in. belt.

A pipe machine usually receives little consideration in the majority of shops and is probably the most abused of any one in use, and must, therefore, be built to withstand this hard usage and at the same time be as simple in construction as possible.